



# Strengthening Regional Water Security for Greater Resilience in the G5 Sahel

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## Acronyms

ALG	Liptako-Gourma Authority	NEDI	North and North Eastern Development Initiative
ASA	Advisory Services and Analytics	OMVS	Senegal River Basin Organization
CILSS	Permanent Interstate Committee for drought control in the Sahel	PANGIRE	National Water Resources Action Plan
CMU	Country Management Unit	PGIRE	Senegal River Basin Multi-Purpose Water Resources Development Project
CNRE	Centre National des Ressources en Eau	PRAPS	Regional Sahel Pastoralism Support Project
ECOWAS	Economic Community of West African States	RBO	River Basin Organization
ECOWAS RAHC	ECOWAS Regional Animal Health Centre	SIIP	Sahel Irrigation Initiative Project
FAO	Food and Agriculture Organization	SMAB	Senegal-Mauritanian Aquifer Basin
FCS	Fragile and Conflict-Affected Situations	SLWM	Sustainable Land and Water Management
FCV	Fragile, Conflict, and Violence	TLU	Tropical Livestock Unit
FLL	Field-Level Leadership	TTL	Task Team Leader
FSRP	Food System Resilience Program	UN	United Nations
GDP	Gross Domestic Product	UNDP	United Nations Development Program
GEMS	geo-capacitation method	VBA	Volta Basin Authority
GP	Guiding Principle	WAEMU	West African Economic and Monetary Union
ITA	Integrated Territorial Approach	WALP	Water for Agro-pastoral Productivity and Resilience
IWRM	Integrated Water Resources Management	WARP	Water for Agropastoral Livelihoods Pilot Project
IWSPP	Integrated Water Security Platform Project	WBG	World Bank Group
LDC	Least Developed Country	WiCER	Water in Circular Economy and Resilience
MNA	Middle East North Africa	WSS	Water Supply and Sanitation
MW	Mega-Watts		
NBA	Niger Basin Authority		







## FOREWORD

**1. The World Bank's historical engagement in transboundary water in West Africa is at a turning point, at a time when the G5 Sahel region faces unprecedented challenges.** The G5 Sahel consists of Burkina Faso, Chad, Mali, Mauritania, and Niger.<sup>1</sup> Over the past 20 years, World Bank regional water projects in West Africa have focused on transboundary water cooperation and management, informed largely by an integrated water resources management (IWRM) approach and working through River Basin Organizations (RBOs) as natural counterparts. A recently completed retrospective of this engagement indicates mixed results.<sup>2</sup> While several tangible and intangible results have been achieved, particularly in the Senegal and Niger river basins, it has become clear that given the challenges faced by the G5 Sahel countries, a more comprehensive intervention paradigm is needed. These challenges include natural resources degradation, expanding fragility, rapid population growth, and climate change – which in turn exacerbate conflicts around access to resources, including water – a self-reinforcing downward spiral that must be urgently addressed to achieve G5 Sahel's development priorities. Moreover, water is largely absent in regional development strategies, possibly because since to date, no regional evaluation exists of the key role that water (security) plays for the socio-economic development, resilience, and security of the G5 Sahel. This reflection is the key theme of this study.

**2. Therefore, it is time for the World Bank to broaden its water sector approach in the G5 Sahel and shift its focus to establishing a regional water security framework.** As the two remaining transboundary water projects<sup>3</sup> are coming to an end, it is time to revisit the strategy for the next phase of World Bank engagement in this space in the G5 Sahel. We find ourselves at a critical juncture to strategize on how to effectively improve water security as a means to boost socio-economic development and reduce fragility and conflict in the G5 Sahel countries. Water security is defined here as the availability of an acceptable quantity and quality of

water for health, livelihoods, ecosystems and production, coupled with an acceptable level of water-related risks to people, environments and economies.<sup>4</sup> Water security in the G5 Sahel, as explained later in this note, directly contributes to supporting socio-economic development, improving stability and security, and reducing environmental migration. In this context, a water security framework applied at different interconnected scales, from local to national to regional, is a more appropriate entry point to address these challenges than a river-and-RBO-centric perspective. It expands the scope of water interventions to (i) encompass the whole spectrum of water resources, including groundwater (shallow and deep), river (permanent and seasonal), rain and runoff, instead of focusing solely on transboundary river basins; (ii) better integrate multiple water uses (urban and rural water supply and sanitation [WSS], irrigation, rainfed farming, pastoralism, fisheries...) and (iii) address broader questions of fragility and conflict.

**3. The dual objectives of this report on the G5 Sahel region are to (i) do a high-level analysis of water security challenges and their impacts on regional socio-economic development and stability and (ii) suggest directions for future World Bank engagement on regional water security.** The focus of this note is more exclusively on regional water challenges and local challenges with cross-border<sup>5</sup> or even regional spill-over effects. The report takes a development-driven approach to (i) identify some of the ways in which water security affects socio-economic development in the G5 Sahel, (ii) explore the linkages between water security, resilience and conflict prevention and (iii) propose a set of guiding principles for the next regional engagements on water security in the region, both in terms of types of investment and implementation modalities. This report will also serve as a basis for deepening the dialogue with counterparts in the next fiscal year.

**4. Methodology.** A rapid review was conducted from January to May 2021. Given the timeframe and budget, the ASA included a high-level scoping of issues, and did

1 The G5 Sahel consists of Burkina Faso, Chad, Mali, Mauritania, and Niger. The institutional platform of the G5 Sahel was established in 2014 to improve the coordination of regional cooperation regarding development policies and security matters in West Africa.

2 World Bank, 2021. World Bank Engagement In Transboundary Water In West Africa - Retrospective And Lessons Learned – therein referred to as "The Retrospective".

3 Senegal River Basin Multi-Purpose Water Resources Development Project (PGIRE2, P131323) in the Senegal River Basin, with OMVS; and the Kandadji project on the Niger River (P172724).

4 Grey, D., Sadoff, C.W., 2007. Sink or Swim, Water Security for Growth and Development. Water Policy 9, 545–571.

5 By cross-border it is meant involving at least one border, including challenges that are felt and dealt with by two sub-national entities across the border.

not produce any new data but focused on taking stock of the current state of the G5 Sahel region in terms of water security, identifying key gaps and challenges based on on-going work in the region, and recommending options for our future engagement. Given the time constraints, the note focuses more on the agriculture, livestock, ecosystem, and domestic water use sectors, and only touched tangentially others, such as transport and energy. The team, itself involved in the majority of regional and national projects and initiatives,<sup>6</sup> has exchanged with different regional and national clients, with the relevant Country Management Units (CMUs), and with several colleagues from both water and other sectors and with experience in FCV contexts and water security.<sup>7</sup> The team also discussed potential

implementation arrangements in fragile areas with the Program Manager of GIZ Support to the Kofi Annan International Peacekeeping Training Centre and UNDP Mali. Given COVID19 travel restrictions, the team was not able to carry out field missions.

**5. Structure of the report.** The report first contextualizes water security in the G5 Sahel by analyzing the links between water, socio-economic development, and stability – I-IMPORTANCE OF WATER SECURITY FOR THE G5 SAHEL. It then presents several guiding principles and investment opportunities for the next regional water engagement in the G5 Sahel – II-FORWARD LOOK.

- 6 Amongst others: Regional operations: Senegal River Basin Multi-Purpose Water Resources Development Project (P131323, P131353, P153863), Sahel Irrigation Initiative Project (SIIP, P154482), the engagements in the Niger River Basin (including recently, the CIWA-funded Niger Basin Support Management Project (P149714) and the Kandadji project P172724); West Africa Food System Resilience Program (FSRP, P172769, under preparation); National operations: Niger Integrated Water Security Platform Project (Niger-IWSPP, under preparation, P174414); ALBIÄ - Chad Local Development and Adaptation Project (P171611) and Mauritania Water and Sanitation Sectoral Project (P167328, the first national water project in Mauritania in more than a decade) in FY21; CIWA Improving Water Resources Management in West and Central Sahel (P173152), including ASAs on Water security in Burkina Faso (P174857) and Strengthening Water Security in Senegal for Greater Resilience (P172233), and the ASA on groundwater in the Sahel; outputs of CIWA-funded Niger Basin Support ASA (P148889).
- 7 Including task teams of Regional Sahel Pastoralism Support Project (PRAPS, Agricultural Global Practice), Three Borders Project (Social Global Practice), Somalia Water Engagement and Kandadji project (Water Global Practice, and MNA FCV Focal point (Water Global Practice), High and Dry report's team.





# I. IMPORTANCE OF WATER SECURITY FOR G5 SAHEL

## 6. Water is the backbone of the fragile socio-economic development in the G5 Sahel and its insecurity fuels instability in the region.

Extreme poverty is pervasive in the Sahel, and the G5 Sahel countries rank low on almost all the human development indicators. All the G5 Sahel countries are classified by the United Nations as least developed countries (LDCs) and among the 40 poorest countries in the world in terms of GDP per capita. Furthermore, the Human Capital Index, which quantifies the contribution of health and education to the productivity of the next generation of workers, shows that all five countries are in the bottom 40 (out of 157) - with four in the bottom 20. The livelihoods and economies of the largely rural Sahelian population, mostly family and subsistence farmers and nomadic or semi-nomadic herders, are highly dependent on water. In dry and poor countries like those of the G5 Sahel, such dependence creates a high degree of vulnerability to structural changes — in particular to rapid population growth and rising water demands, climate change, and management challenges such as groundwater overexploitation, environmental degradation, and water resources' pollution. These trends increase overall vulnerability as well intensify conflict and fragility in the Sahel and, in some cases, even play a role in driving it; for example, in certain cases of farmer-herder conflict. Water insecurity constrains food production, nutrition, and health as well as opportunities for education, work, and improved livelihoods.

## 7. Today in the G5 Sahel, while at the national level annual renewable water availability is sufficient for socio-economic needs, the large spatial and temporal variations of water resources, together with structural constraints, mean that large portions of the population in these countries face extreme water insecurity.

As Figure 1a shows, according to the FAO, only Burkina Faso and Niger are experiencing frequent water stress periods. Nevertheless, these estimates — which a recent study on water security in Senegal also found to be overoptimistic<sup>8</sup> - mask a large spatial and temporal variability of water resources. In reality, only a fraction of the population has access to permanent rivers, the rest

depends largely on rainfall, which is scant, has unimodal distribution with a long dry season and is subject to wide inter-year and multi-decadal variations underpinning the big droughts witnessed in the last century. Even where water is available, human, institutional, and financial capital limit access to water despite its physical availability. Lack of investments, weak institutional capacity, lack of maintenance, and inequal water distribution, all hinder the actual use of this resource for both consumptive and productive uses — and in turn, hamper socio-economic development of the region. As a result, a large share of the population is today water insecure.

## 8. Moreover, high rates of population growth will half the current renewable water resources available per capita in the next twenty years and climate change is expected to further exacerbate variability.

The total population in the region is projected to almost double by 2040, with a largely young population (47 percent of the population is under 15 in 2018) due to their stage in the demographic transition (low life expectancy and high fertility rates, with Niger the highest in the world).<sup>9</sup> The expected doubling of the Sahelian population from 86m to 173m by 2040<sup>10</sup> will, alone, bring four of the five G5 countries in a water stressed status, with Burkina falling below the absolute water scarcity threshold (Figure 1b). Due to climate change, despite all related uncertainties on its actual manifestations, it is likely that spatial and temporal variability will also increase, further exacerbating the water insecurity of Sahelian populations. Figure 2 already shows a trend of increasing population in areas already water stressed.

## 9. Therefore, achieving regional water security today - harnessing the productive potential of water, providing for basic human needs, and limiting its destructive impact – while ensuring resilience under a changing climate and other changes, needs to become a societal priority.

8 Under the *Strengthening Water Security in Senegal for Greater Resilience (P172233)*, the team — based on the most recent literature available and a review of the data in AQUASTAT - estimated the total annual renewable water resources at 1451 m<sup>3</sup>/yr/capita when AQUASTAT indicated 2459m<sup>3</sup>/yr/capita — a 40 percent difference.

9 Ibid.

10 UNDESA, Population Division (2018). *World Urbanisation Prospects: The 2018 Revision*, Online Edition

## 1.1. A two-tier approach to water security in the G5 Sahel region

**10. Framing water security in terms of both local and regional challenges allows to broaden the scope of transboundary cooperation and keep it moving on various tracks according to the appropriate scale for specific problems.** Local water challenges with cross-border impact are paralleled by regional water challenges that imply outright hydraulic interconnectedness and usually revolve around the main transboundary rivers. In the Sahel, rural areas tend to concentrate water-dependent livelihoods, low access to water services, and host the poorer and most vulnerable segments of the population, who are more exposed to environmental migration, agropastoral tensions, and exclusion and marginalization — all potentially causing cross-border impacts. For instance, more frequent droughts and increasingly destructive floods resulting from climate change are disrupting water and food supply, causing fatalities, and leading to gradual long-term out-migration. Today, in Burkina Faso, Mali, and Niger, 2.4 million people — largely rural — are struggling with food insecurity while the prevalence of stunting in children under five is as high as 49 percent in Niger.<sup>11</sup> Lack of grass for animal feed and water shortages make pastoralists migrate earlier toward agricultural areas, often located along permanent water courses, creating tensions with farmers. Therefore, it is important to tackle water insecurity at a more local level to reduce these cross-border impacts. At the same time, these challenges are compounded at a more regional level by the development of large transboundary infrastructure, growing unregulated water abstractions by large water users such as capital cities and mega irrigation schemes, and pollution from mining and poor sanitation in large urban centers. If not properly managed, these factors can lead to an unequal sharing of benefits, negative environmental impacts, and also contribute to

fueling tensions and conflict. Figure 3 conceptualizes the framework of the analysis guiding this Chapter I, that explains these two dimensions and their interconnectedness with regional instability.

## 1.2. Water as a foundational resource for socio-economic development

**11.** This section explores the importance of water for human development and for the main water-dependent economic sectors in the region — agriculture and livestock — and the contribution of transboundary water to the region's economy and access to basic services.

### 1.2.1. Low access to basic water supply and sanitation services hinders human well-being and development, particularly in the rural areas

**12. About forty percent of the population in G5 Sahel still lacks basic access to water supply<sup>12</sup> and close to eighty percent do not have access to improved sanitation,<sup>13</sup> hindering human well-being and development.** Safely managed WSS services are indispensable components of human capital, as they contribute to raising living standards, good health, and high labor productivity.<sup>14,15</sup> As a result of low levels of access and low quality of service, diarrheal diseases and other communicable diseases are the leading causes of mortality among children under five years of age,<sup>16</sup> and in 2016 annual mortality rates attributed to unsafe water, unsafe sanitation and lack of hygiene were 39 per 100,000 people in Mauritania, 50 in Burkina Faso, 71 in Niger and Mali, and 101 in Chad,<sup>17</sup> almost all above the Sub-Saharan African average of 47.<sup>18</sup> Lack of access

11 WDI, 2020. Human Development Index.

12 Progress on drinking water, sanitation and hygiene: 2017 update and SDG baselines. Geneva: World Health Organization (WHO) and the United Nations Children's Fund (UNICEF), 2017. Access numbers are as follows: Burkina Faso — access to basic water 47.89 percent, basic sanitation 19.40 percent and basic hygiene 11.88 percent; Chad — access to basic water 38.7 percent, basic sanitation 8.34 percent and basic hygiene 5.82 percent; Mali — access to basic water 78.26 percent, safely managed sanitation 18.71 percent, and basic hygiene 52.23 percent; Mauritania — access to basic water 70.70 percent, basic sanitation 48.44 percent and basic hygiene 43 percent; Niger — access to basic water 50.27 percent, safely managed sanitation 9.6 percent.

13 Kwasi, S., Cilliers, J., Donnenfeld, Z., Welborn, L., Maïga, I., 2019. Prospects for the G5 Sahel Countries to 2040. Institute for Security Studies.

14 RWSN, 2010. Myths of the Rural Water Supply Sector. Perspectives No 4.

15 Sadoff, C.W., Borgomeo, E., de Waal, D., 2017. Turbulent Waters: Pursuing Water Security in Fragile Contexts. Washington, DC, World Bank.

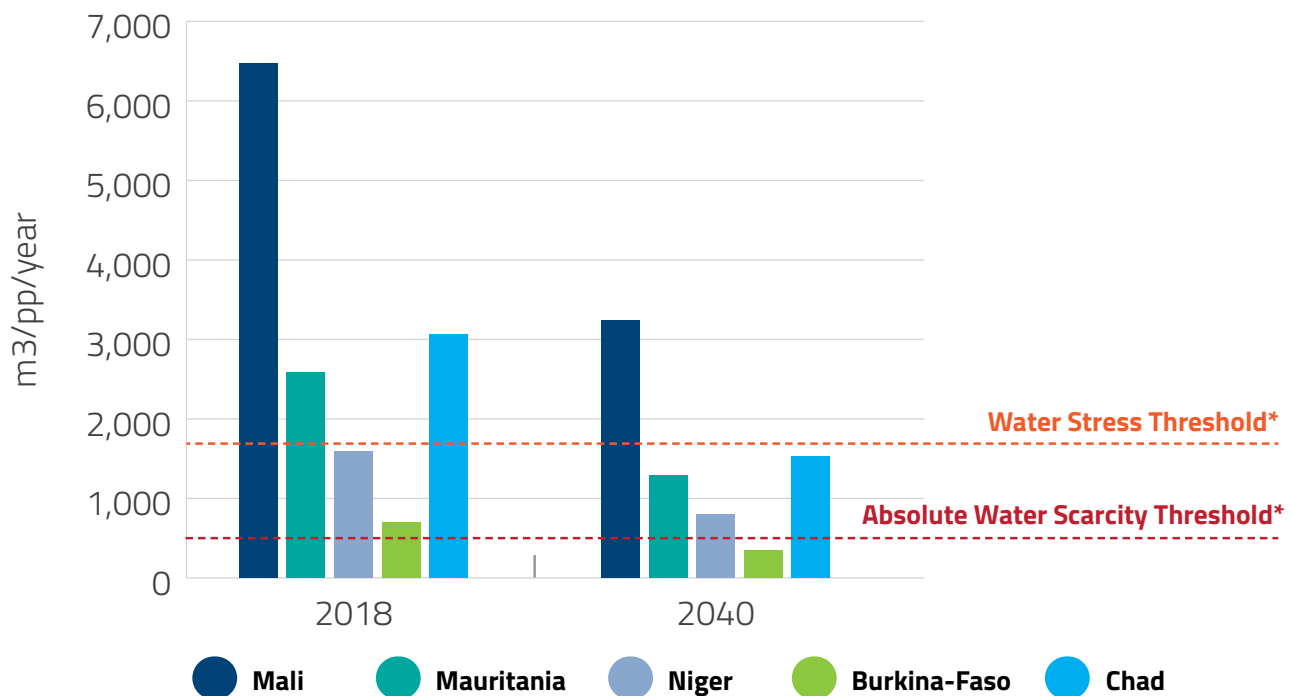
16 Kwasi, S., Cilliers, J., Donnenfeld, Z., Welborn, L., Maïga, I., 2019. Prospects for the G5 Sahel Countries to 2040. Institute for Security Studies.

17 WHO, 2016. Global Health Observatory Data Repository, 2016.

18 <https://data.worldbank.org/indicator/SH.STA.WASH.P5?locations=ZG>



**Figure 1 Regional comparison of renewable water resources available per capita in G5 Sahel countries**



Source: FAO AQUASTAT, 2019

to safe water and sanitation negatively affects human development, sometimes irreversibly, and causes stunting, which reduces the labor force available for sustaining people and the economy. At thirty percent, the rate of stunting in the region is about five percentage points higher than the average for other low-income African countries.<sup>19</sup>

**13. The impacts of poor WSS services are felt acutely in rural areas, where the majority of the population resides.** Rural areas in the G5 Sahel consistently show lower access levels to water supply, sanitation and hygiene services. In rural Chad, access to basic water services falls just below 30 percent, against almost 70 percent in urban areas.<sup>20</sup> Sanitation numbers are even more dire, with under 2 percent access to basic sanitation in rural areas against 30 percent in urban areas, and hygiene at 2.3 percent and 18 percent respectively.

**14. Unprecedented urbanization, compounded by climate change and rapid population growth, will further challenge WSS service provision.** In the G5 Sahel, large urban centers are located both on riverbanks (Bamako, Niamey) and further away but rely on long-distance transfers from shared rivers (e.g. Ouagadougou, Dakar, Nouakchott). While today urbanization rates are currently low,<sup>21</sup> hampering access to services, rapid population growth combined with instability and climate change will accelerate urban growth by driving people towards cities. Indeed, the influx of migrants from conflict and degradation of rural environments is expected to increase in the near future and put additional pressure on already fragile water services in host communities (see Paragraph 31). In Burkina Faso, just over 30 percent of the population currently lives in cities, and the urbanization rate is expected to pass the 50 percent mark by 2050.<sup>22</sup> Population is expected to rise particularly in secondary cities, where in addition to population from rural areas, a growing urban middle

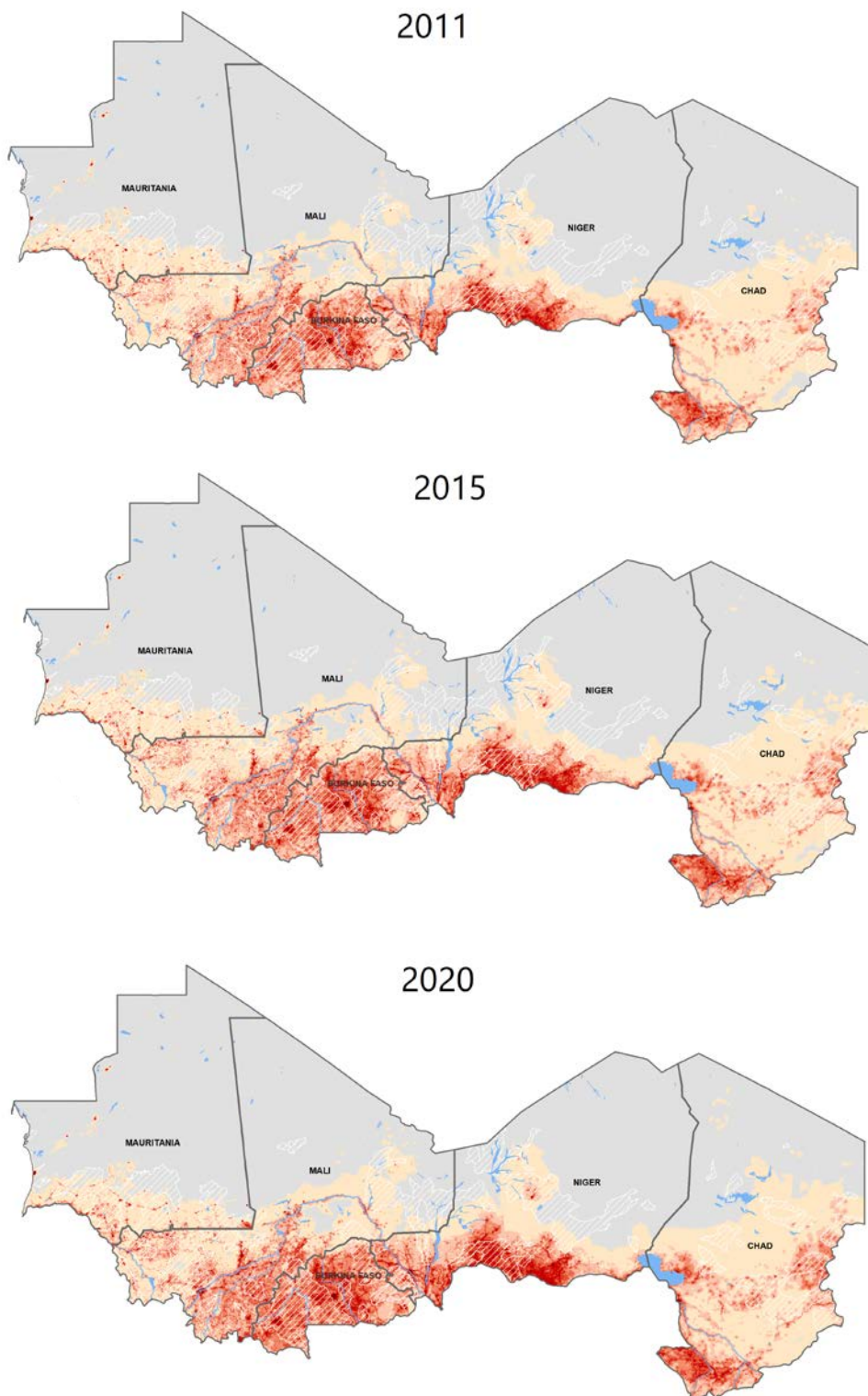
<sup>19</sup> Kwasi, S., Cilliers, J., Donnenfeld, Z., Welborn, L., Maïga, I., 2019. Prospects for the G5 Sahel Countries to 2040. Institute for Security Studies.

<sup>20</sup> Progress on drinking water, sanitation and hygiene: 2017 update and SDG baselines. Geneva: World Health Organization (WHO) and the United Nations Children's Fund (UNICEF), 2017.

<sup>21</sup> Kwasi, S., Cilliers, J., Donnenfeld, Z., Welborn, L., Maïga, I., 2019. Prospects for the G5 Sahel Countries to 2040. Institute for Security Studies.

<sup>22</sup> UNFPA. Monographic Study on Demography, Peace, And Security in The Sahel: Case of Burkina Faso.

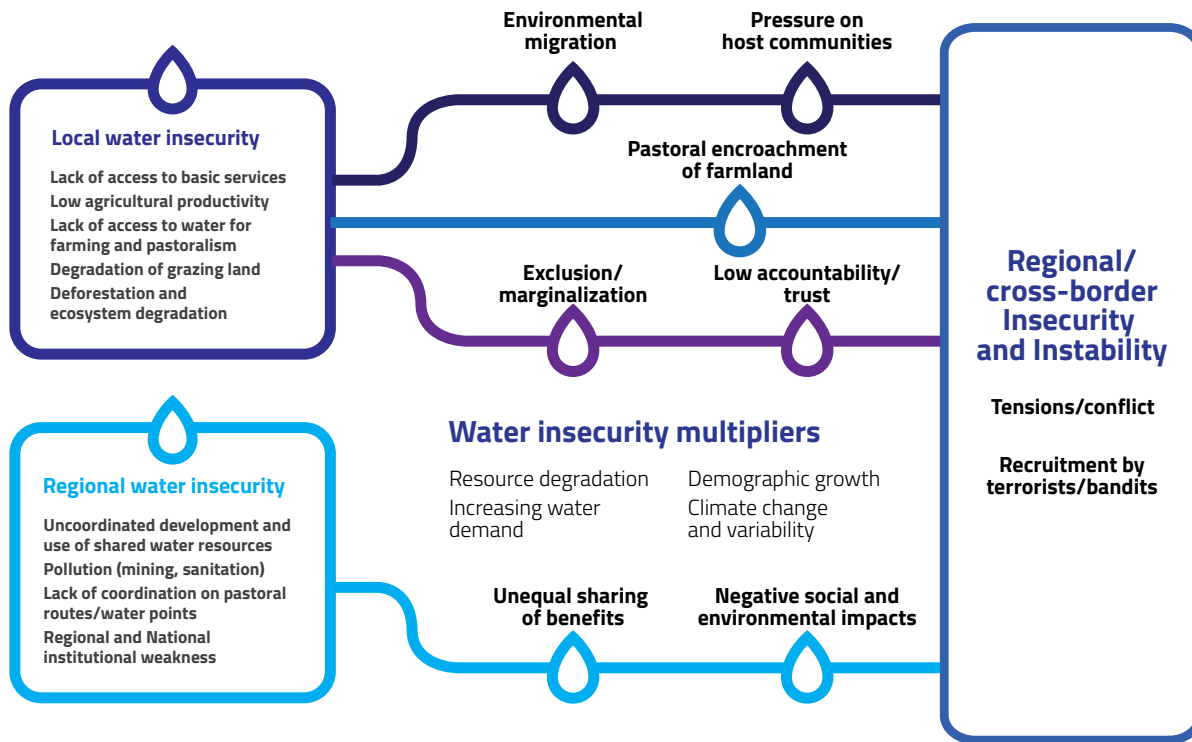
**Figure 2** Evolution of population growth vs. water stress (2011-2015-2020)





**Figure 3 Conceptual framework of water security and its links with fragility and conflict in the G5 Sahel**

Water is the backbone of the fragile socio-economic development in the G5 Sahel and its insecurity fuels instability in the region.



class with a higher water-footprint will substantially increase water demands, putting pressure on already poor water services. As cities are not equipped with the urban planning mechanisms to successfully meet this growing water demand, and climate change impacts the availability and reliability of water resources, a larger urban water deficit is likely to develop. As water availability decreases and becomes more unreliable, and cities grow, urban water security will depend on expanding beyond an access-focused approach towards the delivery of resilient and inclusive services that make the most of existing infrastructure, managing demands, improving efficiency, designing out waste and pollution through efficiency and resource recovery, and the regeneration of natural systems and closing the water services cycle.

**15. Poor quality of sanitation and water treatment services is also a significant source of pollution, with repercussions on public health and the environment, and significant economic costs.** Low coverage sanitation and poor water treatment infrastructure in urban areas, lead to untreated wastewater and fecal sludge discharge to the environment, polluting aquifers and rivers. In Ouagadougou, 64 percent of fecal sludge is not safely managed.<sup>23</sup> Urban service providers bring services of mixed quality, which challenges cost recovery and their ability to repair and expand infrastructure. In Niger, the economic losses from inadequate WSS are estimated to amount to more than 10 percent of the country's GDP (2010 estimates).<sup>24</sup> In Bamako, faecal sludge is being discharged straight into the Niger river without any treatment. Safely managed water and sanitation services are also essential in preventing disease and protecting human health during outbreaks of infectious

<sup>23</sup> [https://www.susana.org/\\_resources/documents/default/3-3471-7-1541610165.pdf](https://www.susana.org/_resources/documents/default/3-3471-7-1541610165.pdf)

<sup>24</sup> Sadoff, C.W., Hall, J.W., Grey, D., Aerts, J.C.J.H., Ait-Kadi, M., Brown, C., Cox, A., Dadson, S., Garrick, D., Kelman, J., McCornick, P., Ringler, C., Rosegrant, M., Whittington, D., Wiberg, D., 2015. Securing Water, Sustaining Growth: Report of the GWP/OECD Task Force on Water Security and Sustainable Growth, University of Oxford, UK, 180pp.

diseases, including the current COVID-19 pandemic. As quickly urbanizing cities struggle to cope with their rapidly growing populations, pollution from untreated wastewater and poorly managed solid waste dragged into waterways will continue to increase, while the developing industrial and mining sectors are also likely to impair the quality of water resources. Artisanal gold mining, for example, is an important economic contributor throughout the G5 Sahel<sup>25</sup> and is known to have dire impacts on nearby water quality.

### 1.2.2. Improving water use in agriculture is critical for improving productivity and sustaining food security

**16. Agriculture accounts for the lion's share of water abstractions and contributes most to national GDP and employment in all G5 Sahel countries.** In the G5 Sahel, agriculture is the largest water user, with agricultural withdrawals accounting for between 51 percent (in Burkina Faso) to 97 percent (in Mali) of total water withdrawals<sup>26</sup> With 36 million hectares cultivated (~10% of the total surface), the agriculture sector contributes between 30 and 40 percent of national GDP; it accounts for a staggering 25 percent of total employment in Burkina Faso, 50 in Mauritania, 68 in Mali, 75 in Niger<sup>27</sup> and 80 in Chad. Agriculture absorbs 12 and 11 percent of national budgets in Mali and Burkina Faso, respectively.<sup>28</sup>

**17. Agricultural production in the G5 Sahel, with less than 40 percent of irrigation potential developed, is still largely reliant on scarce and increasingly variable and unreliable rainfall.** Today, 38 percent of the irrigation potential has been developed, but only half of the area equipped for irrigation is actually irrigated (Table 1). Most

of the irrigated area depends on (transboundary) rivers like the Niger and the Senegal rivers, with groundwater irrigating less than 15 percent of the total irrigated lands<sup>29</sup>. The remaining 35 million hectares are rainfed, with large scope to improve yields. Improving water use in agriculture, both irrigated and rainfed, could contribute to stabilizing and increasing food production to respond to a rapidly growing food demand.<sup>30</sup>

**18. Considering the high costs of irrigation in the Sahel and the large potential to significantly increase rainfed crops yields, investing in both irrigated and rainfed input intensification offers the largest potential gains<sup>31</sup> over investing in irrigation alone.** Irrigation

costs in Sub-Saharan Africa are among the highest in the world with average irrigation-related total unit project costs at US\$ 11,800/ha compared to US\$ 3900/ha for projects outside of Sub-Saharan Africa.<sup>32</sup> Moreover, the maintenance of irrigation systems is at times prohibitive for farmers. Mauritanian farmers along the Senegal River Valley are abandoning irrigated rice as irrigation schemes are gradually falling into disrepair given their maintenance costs, which are superior to the marginal gains from irrigated rice.<sup>33</sup> Similarly, a modelling study focused on the Niger basin demonstrated small marginal yield gains between intensified rainfed and irrigated farming which would not encourage the shift to costly irrigation practices.<sup>34</sup> This comparison, however, only applies to newly developed irrigation schemes, while much is to gain from rehabilitating or retrofitting existing schemes (as pointed out in Paragraph 19). Therefore, in a context of limited national budget, irrigation extension should be carefully considered, while there is much scope to increase the productivity of rainfed farmland. For instance, there is large untapped potential to capture a much bigger portion of rain and runoff for rainfed agriculture. In these rainfed areas, effective

25 <https://www.cipe.org/blog/2020/07/27/a-pivotal-moment-to-regulate-artisanal-gold-mining-in-burkina-faso/>

26 FAO AQUASTAT, 2018. Accessed June 2021. Agricultural water withdrawal as % of total water withdrawal for the Chad, Mauritania, and Niger are respectively 76, 90, 87 percent.

27 Covid-19 Pandemic: Impact of restriction measures In West Africa. ECOWAS/UN-ECA/WFP/CERFAM.

28 World Development Indicators database

29 Analyse des opportunités de développement de l'irrigation au Sahel à partir des eaux souterraines. World Bank, Working Document, 2016.

30 According to FAO AQUASTAT, out of the 75.5 million hectares of arable land in West Africa, only 1.2 percent (917,000 ha) is developed for irrigation, and 0.8 percent (635,000 ha) is used effectively. Future developments of irrigation will largely depend on transboundary waters, both surface and groundwater.

31 Van Der Wijngaart, R., Helming, J., Jacobs, C., Garzon Delvaux, P.A., Hoek, S. and Gomez y Paloma, S., 2019. Irrigation and irrigated agriculture potential in the Sahel: The case of the Niger river basin: Prospective review of the potential and constraints in a changing climate. JRC Technical Report.

32 Inocencio, A., Kikuchi, M., Tonosaki M., Maruyama, A., Merrey, D., Sally, H., de Jong, I., 2007. Costs and performance of irrigation projects : A comparison of sub-Saharan Africa and other developing regions. Colombo, Sri Lanka: International Water Management Institute. 81 pp. (IWMI Research Report 109).

33 Comas, J., Connor, D., et al., 2012. Why has small-scale irrigation not responded to expectations with traditional subsistence farmers along the Senegal River in Mauritania? *Agricultural Systems* 110, 152-161.

34 Van Der Wijngaart, R., Helming, J., Jacobs, C., Garzon Delvaux, P.A., Hoek, S. and Gomez y Paloma, S., 2019. Irrigation and irrigated agriculture potential in the Sahel: The case of the Niger river basin: Prospective review of the potential and constraints in a changing climate.



**Table 1** Area equipped for irrigation, actual irrigated area, and irrigation potential

	Cultivated area (1000 ha)	Area equipped for irrigation (1000 ha)	Actual irrigated area (1000 ha)	cultivated area equipped for irrigation (%)	Irrigation potential (1000 ha)	irrigation potential de- veloped (%)
Burkina Faso	6 100	54	46	0.9	165	33
Chad	5 238	30	26	0.6	335	9
Mali	6 561	371	176	5.7	566	66
Mauritania	411	45	23	11.0	250	18
Niger	17 818	102	88	0.6	270	38
<b>G5 Sahel</b>	<b>36 128</b>	<b>602</b>	<b>359</b>	<b>1.6</b>	<b>1586</b>	<b>38</b>

Source: FAO AQUASTAT, 2017, accessed April, 2021

water harvesting practices and improved soil fertility management and pest control represent a promising combination to significantly lift the yields of rainfed crop.

**19. Small-scale irrigation systems offer the second largest potential gains to improve agricultural productivity.**<sup>35</sup> Where irrigation remains necessary, several studies estimating the irrigation potential in the Soudano-Sahelian region, considering water and land resources as well as socio-economic variables, point at a great potential for expanding small-scale irrigation, particularly in Mali. Compared to large dam-based centrally managed schemes such as the Office du Niger, individually or community-managed small-scale irrigation offers higher potential profits and internal rates of return.<sup>36,37,38,39</sup> These schemes will/do in large part rely on groundwater sources. Nevertheless, many barriers remain for the development of groundwater-based small irrigation schemes, amongst others the poor quality of the wells and boreholes, the access to adequate pumping technology and credit, or the difficulty to optimize abstraction costs, as well as challenges related to knowledge of the resource and managing its sustainable use.

**20. There is large scope in the G5 Sahel for improving the efficiency of existing irrigation systems through rehabilitation and increased crop and water**

**productivity, thus reducing irrigation expansion needs and freeing up water resources.** Assessment of the irrigation service in both large and small-medium irrigation schemes along the Senegal River Valley in Mauritania indicates that the lack of investment in maintenance is driving many irrigation systems across typologies (large publicly owned and managed, PPPs, medium-small village schemes) down the degradation spiral, which, in turn, affects the irrigation service and further hampers crop productivity and farmers' income. It has also been estimated that rehabilitating irrigation networks in Mali would double current agricultural productivity, reducing the need for irrigation expansion. Significant water savings will allow expansion of irrigated area in the future, if needed. Despite evidence of large potential gains in increasing both crop productivity and irrigation performance, some large schemes, like the Office du Niger in Mali, still plans to triple its irrigated surface. Raising the efficiency and productivity of existing irrigation schemes should therefore be a priority for future investments, even if located in conflict areas. For instance, despite the development of an ASA (P166890) and government interest, the Bank has not been engaging with the Office du Niger, which operates in a high-risk conflict area (especially in Northern part of its service area). Yet, it is the core rice producer of the region and increasing its efficiency would yield several benefits such as creating job opportunities and

- 35 Van Der Wijngaart, R., Helming, J., Jacobs, C., Garzon Delvaux, P.A., Hoek, S. and Gomez y Paloma, S., 2019. Irrigation and irrigated agriculture potential in the Sahel: The case of the Niger river basin: Prospective review of the potential and constraints in a changing climate. JRC Technical Report.
- 36 You L., et al. 2010. What is the irrigation potential for Africa? A combined biophysical and socioeconomic approach. Food Policy 36(6): 770—782. IFPRI Discussion Paper 00993 (40 pages).
- 37 Xie, H., You, L., Wielgosz, B., & C. Ringler. 2014. Estimating the potential for expanding smallholder irrigation in Sub-Saharan Africa. Agricultural Water Management 131(0), 183-193.
- 38 Burney, J. A., R. L. Naylor, S.L. Postel, 2013. The case for distributed irrigation as a development priority in sub-Saharan Africa. Proceedings of the National Academy of Sciences 110(31), 12513-12517.
- 39 Giordano, M., De Fraiture, C., Weight, E., Van der Bliet, J., 2012. Water for Wealth and Food Security: Supporting Farmer-Driven Investments in Agricultural Water management (International Water Management Institute, Colombo, Sri Lanka)

eventually helping to stabilize the area. The Government of Mali also recently asked support for the rehabilitation of 34,000 ha operated by the Office de Riz de Segou, which would directly benefit more than 120,000 people. These two perimeters are the two largest users of water in the Niger river basin, and lay just ahead of the Niger Inner Delta, a fragile ecosystem, threatened by flow regulations and pollution coming from upstream, and yet sustaining the livelihoods of millions of people. The rehabilitation of existing infrastructure would thus secure high positive impacts with relatively simple interventions.

**21. Flood-recession agriculture is another type of farming - largely neglected by development policies yet widely spread along both the Senegal and Niger river valleys- which would benefit greatly from improved water management.** FAO<sup>40</sup> estimates that prior to the construction of Manantali dam on the Senegal River, the floodplain stretched up to 30 km in width, covered a total of about 1 million ha and supported up to half a million people that depended on the flood-related cropping. Although the expansion of irrigation and the reduced floods as a result of Manantali have come at the detriment of flood-recession agriculture, it still represents a critical lifeline for the local riverine population. The productivity of flood-based farming is generally lower than that of irrigated land, however, flood-recession agriculture yields sorghum, beans and melons between the normal harvest periods of rice and onions at times when other agricultural contributions to the household subsistence are limited. Since labor inputs are very low, it represents an appealing strategy to diversify and secure their food supplies. Similarly, in the Niger Inner Delta, it is estimated that in wet years, more than 34 000 km<sup>2</sup> are inundated. The ecosystem of the Niger River inland delta and the traditional farming systems that use its natural resources in the flood plains and the lakes (fisheries, agriculture, livestock) depend directly on the extent of the annual river floods. These traditional farming systems are threatened by any extension of the irrigation schemes upstream of the delta (notably, the Office du Niger, already diverting annually 10 percent of the Niger river waters) or the installation of dams (i.e.,

Fomi dam in Guinea or Taoussa in Mali) is, therefore, going to have an impact on the ecosystem and thus on the traditional farming systems supporting the livelihoods of 1 million people.

**22. “Sustainable land and water management, and soil fertility management are imperative and as important as irrigation to sustain agricultural production in the G5 Sahel — in addition to several other co-benefits that can be captured via an integrated landscape management.** The terrible drought and crisis of 1984 brought to light the inappropriate soil and water management carried out in the Sahel area until then: mismanagement of grazing and poor farming practices, promoted by governments and the farmers themselves in rainy periods, had caused a systematic over-exploitation of the land well above its average capacity to provide water and pasture. The short-term vision of governments and communities, seeking to maximize economic returns in the shortest possible time, had led to a severe degradation of the soil. Today, the Sahel is one of the most environmentally degraded regions on the planet. The UN estimates that roughly 80 percent of farmland in the Sahel is degraded, which threatens productivity: today nutrient limitation is the second-most limiting factor to crop productivity after water.<sup>42,43,44</sup> Moreover, a degraded soil is frequently too dry to absorb the rainfall: as a result, destructive river floods and numerous flooding episodes were thus observed in Mali and Niger in 2019, for instance from the Sirba basin in Burkina onto Niamey. Though unlocking private sector investment and support for land restoration has been historically challenging, today private-sectors players can harness the opportunity of investment through carbon finance. The demand by companies around the world, which strive to step up their climate commitments, for high-integrity carbon offsetting, particularly for nature-based solutions such as agroforestry, is surging. New standards for measuring soil carbon are allowing the carbon certification for improved agricultural land management practices.

**23. Integrated landscape management (ILM), merging land restoration with sustainable land and water management (SLWM), including catchment**

40 FAO, 1997. Irrigation potential in Africa: A basin approach. FAO Land And Water Bulletin 4. FAO Land and Water Development Division, Rome. M-54 SBN 92-5-103966-6.

41 Source of Figure 4: Reich et al., 2001. [https://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/use/?cid=nrcs142p2\\_054025](https://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/use/?cid=nrcs142p2_054025)

42 Mueller, N. D., Gerber, J. S., Johnston, M., Ray, D. K., Ramankutty, N. & Foley, J. A. 2012. Closing yield gaps through nutrient and water management, 490, 254-257

43 Pastori, M., F. Bouraoui, et al., 2011, GISEPIC AFRICA: A modeling tool for assessing impacts of nutrient and water use in African agriculture. JRC Scientific and Technical Reports. Ispra, European Commission, Joint Research Centre, Institute for Environment and Sustainability. EUR 24912 EN.

44 Saito, K., Vandamme, E., Johnson, J.-M., Tanaka, A., Senthilkumar, K., Dieng, I., Akakpo, C., et al., 2019. Yield-limiting macronutrients for rice in sub-Saharan Africa, *Geoderma* 338, 546-554.

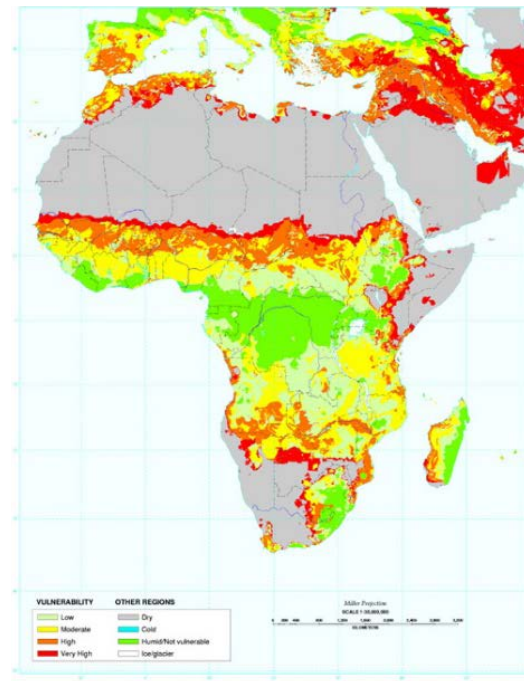
**interventions, combining water buffering with agronomic and biological actions that improve soil health, can be very effective in increasing the productivity of both rainfed and irrigated agriculture, while improving the natural resource base and providing other livelihood opportunities.** ILM aims to protect, within a given area or landscape, the natural capital base by promoting synergies between activities that boost production systems, improve local livelihoods, and support biodiversity conservation and ecosystem services. It incorporates different land and water uses and users into a single management process and provides a basic framework for balancing competing demands and integrating policies for multiple land and water uses within a given area. It is a participatory, community-engaged process for dialogue, planning, negotiating, and monitoring decisions. In a region characterized by land degradation and scarcity of water resources like the G5 Sahel, applying ILM would help restore lands, improve and boost productivity, and livelihoods – with all the associated benefits in terms of reduced migration and fragility.

### 1.2.3. Pastoralists, key water users often neglected in national and regional water policies

#### 24. Pastoralism, another major economic pillar of the Sahel, is yet largely ignored by development policies.

Approximately 13 percent of the population of Western and Central Africa is considered pastoral, being nomadic or semi-nomadic. In Niger, 87 percent of the active population is involved in livestock rearing.<sup>45</sup> Livestock production accounts for at least 25 percent of the GDP of G5 Sahel countries and 40 percent of agricultural GDP in the region on average.<sup>46</sup> This large contribution to the region's GDP is due to the major livestock potential and genetic diversity found in West Africa. The region has about 25 percent of the cattle in sub-Saharan Africa, 33 percent of the sheep, 40 percent of the goats and 20 percent of the camels. Transhumant pastoralism is an important part of the livestock sector, representing between 70 and 90 percent of the cattle population in the Sahel today.<sup>47</sup> Livestock being reared in Sahelian countries is actively traded across Western Africa and represents the second source of export revenue after uranium in Niger, and 30 percent of exports for Chad.

**Figure 4 Desertification vulnerability of Africa**



Pastoralism is also the livestock system best adapted to the Sahelian ecological context and is critical to maintain and regenerate the vast Sahelian rangelands, acting as a carbon sink and supplying ecosystem services. While contributing much to the region's economy and livelihoods, pastoral communities have generally benefitted little from public investment and policies compared to the farming and urban communities.

#### 25. Pastoralism is highly dependent on water and grazing.

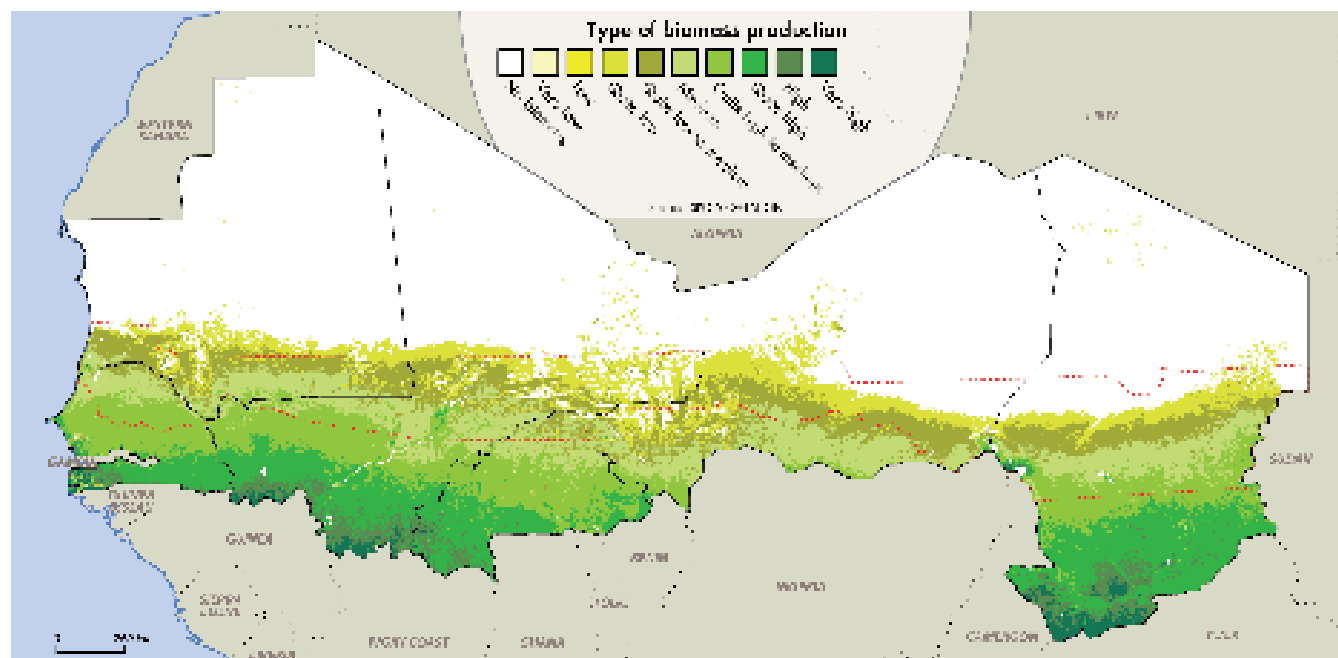
Fodder availability, in quantitative and qualitative terms, is a crucial factor with respect to pastoralism in the Sahel. Figure 5 shows estimated average biomass production over the 1998–2010 period. Rainfall intensity during the rainy season and its spatial distribution determine the potential quantity of fodder available during the subsequent long dry season. Pastoral production is characterized by extreme inter-annual variability due to its high dependence on rain to sustain the grazing grounds, which expand and shrink enormously depending on rainfall. A study in northern Mali showed for instance that feed availability could shrink by two thirds in lean years, leading to significant drop in milk yields and rise in young stock mortality.

<sup>45</sup> Strategie Nationale de l'Hydraulique Pastorale, 2014. Ministère de l'Hydraulique et de l'Assainissement du Niger.

<sup>46</sup> De Haan, C., 2014. "Estimating Livestock Dependent Populations in Mali: Methodological Note." World Bank, Washington, DC.

<sup>47</sup> SWAC-OECD/ECOWAS 2008. Livestock and regional market in the Sahel and West Africa Potentials and challenges.



**Figure 5** Estimated average biomass production over the 1998-2010 period

Source: CIRAD & FAO, 2012. Information system on pastoralism in the Sahel: Atlas of trends in pastoral systems in the Sahel 1970-2012. (p.10)<sup>56</sup>

After a drought, re-stocking may then take several boom years.<sup>48</sup> Moreover, during droughts the average herd/flock size for most households in the Sahel falls below the minimum of about 2.5 TLU (Tropical Livestock Unit, 1 TLU = 250 kg) needed to sustain an average family.<sup>49</sup>

**26. Today, the Sahel's network of pastoral water points is insufficient and needs rehabilitation, which, in addition to mobility restrictions due to agricultural expansion, land policies, and local governance, threatens even further the livelihoods of pastoralists in the G5 Sahel, exacerbating challenges for the economic development.** Today, hundreds of water points, and the nearby grazing areas, have been abandoned across of G5 Sahel countries.<sup>50,51</sup> The lack of a sufficient functional network of watering points for

livestock along transhumant routes and near grazing grounds (both during the dry and wet season) restricts mobility all the more, leads to overgrazing, and limits access to new grazing lands that could represent important fallback sources of feed in lean years. Mobility is key to pastoral systems in arid contexts because it sustains the productivity of grazing resources. Figure 6 displays national and cross-border mobility patterns of pastoralists along grazing and trading routes. In the Sahel, cropland has increased 2.5-fold to the detriment of critical grazing areas, which have decreased by 13 percent. In parallel, the livestock population (expressed in TLU) grew 2.5-fold between 1961 and 2009,<sup>52</sup> leading to increased competition for grazing land, especially higher-potential dry season grazing.<sup>53</sup> The Food Crisis Prevention Network already warned in April 2020 of

<sup>48</sup> <http://www.fao.org/3/i3043e/i3043e05.pdf>.

<sup>49</sup> Sandford, S., 2011. "Too Many People, Too Few Livestock: The Crisis Affecting Pastoralists in the Greater Horn of Africa." Master's thesis. [http://www.future-agricultures.org/pdfpercent20files/Sandford\\_thesis.pdf](http://www.future-agricultures.org/pdfpercent20files/Sandford_thesis.pdf)

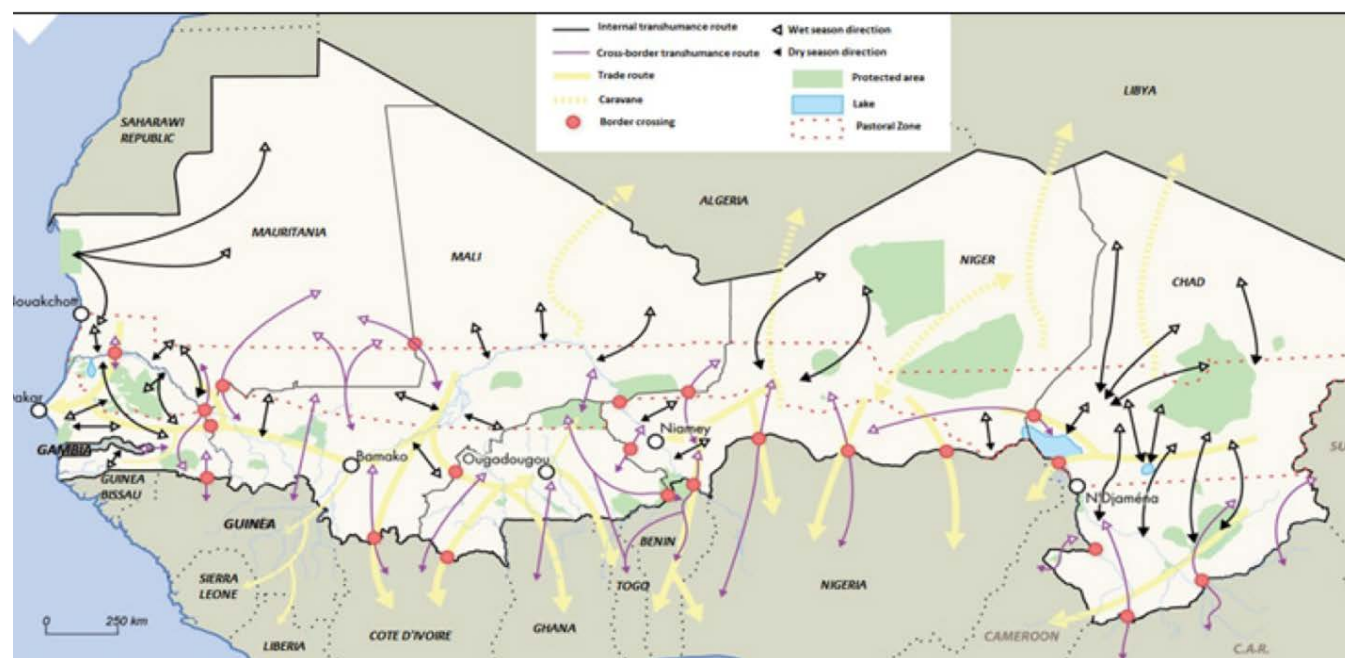
<sup>50</sup> De Haan, C. (editor), 2016. Prospects for Livestock-Based Livelihoods in Africa's Drylands. World Bank Studies. Washington, DC: World Bank. doi: 10.1596/978-1-4648-0836-4. License: Creative Commons Attribution CC BY 3.0 IGO.

<sup>51</sup> ECLIS, 2012. "Contribution of livestock systems to the reduction of rural population vulnerability and to the promotion of their adaptability to climate and society changes in West Sub-Saharan Africa (Senegal, Mali, Niger, Benin)." Résumé exécutif. ANR Project (National Research Agency—France).

<sup>52</sup> SIPSA, 2012. "Atlas of Trends in Pastoral Systems in the Sahel 1970–2012." FAO-CIRAD. Swift, J. 1977. October. "Sahelian Pastoralists: Underdevelopment, Desertification, and Famine." Annual Review of Anthropology 6: 457–78.

<sup>53</sup> De Haan, C. (editor), 2016. Prospects for Livestock-Based Livelihoods in Africa's Drylands. World Bank Studies. Washington, DC: World Bank. doi: 10.1596/978-1-4648-0836-4. License: Creative Commons Attribution CC BY 3.0 IGO

**Figure 6 Summary of national and transborder herd movements and commercial cattle trade channels**



Source: CIRAD & FAO, 2012. Information system on pastoralism in the Sahel: Atlas of trends in pastoral systems in the Sahel 1970-2012. (p.14)

a major food crisis risk in West Africa, hitting pastoral families particularly hard because of both large feed deficits and mobility restrictions linked to Covid-19, which limit cross-border transhumance and the supply of many livestock markets. In national policies for food security and agricultural development, mobility and pastoral communities' needs have largely been ignored.

that they are more likely to include a larger proportion of a country's economic activity. For these basins, cooperative management helps safeguard economic activity and social wellbeing in the riparian countries. Sharing benefits is most critical for basins which have high economic dependence on transboundary waters and high absolute levels of economic activity (UNEP-DHI and UNEP 2016).

#### 1.2.4. Transboundary waters sustain much of the economic activities in this region

**27. A large share of the G5 Sahel economic activities depends on transboundary water resources.** As shown in Figure 7, the region's largest transboundary basins have medium to very high economic dependence linked to them (i.e., a large proportion of national economic activity is located inside the basin). The highest economic dependence is identified in relation to the largest basins (Niger, Chad and Volta), partly because their size means

**28. Transboundary water in the Sahel is also critical for energy security, in a region that faces structural and growing deficits in both.** Transboundary rivers are responsible for practically all hydropower generation in West Africa. With only 17 percent of its 23,500 MW potential developed to date, there is room for expansion. Only 13 percent of the Niger river hydropower capacity of 15,000 MW is developed,<sup>55</sup> 7 percent of the Senegal basin's 6,000MW capacity<sup>56</sup> and 70 percent of the Volta Basin's 2 325 MW capacity.<sup>57</sup> Generated hydropower is exported through the West Africa Regional power

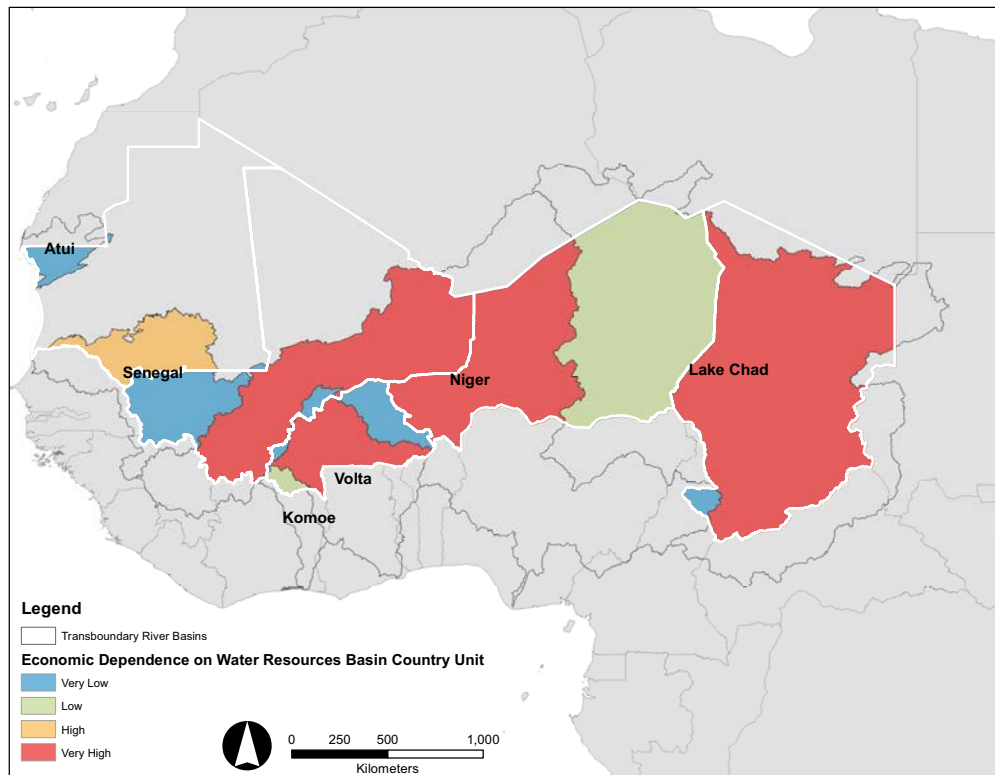
54 [http://www.inter-reseaux.org/IMG/pdf/Atlas\\_SIPSA\\_2012-1.pdf](http://www.inter-reseaux.org/IMG/pdf/Atlas_SIPSA_2012-1.pdf).

55 Though it is not fully exploited. It produces on average 6 500 GWh/year when it could produce up to 30 000 GWh / year. SOURCE: Haut Commissariat à l'aménagement de la Vallée du Niger, 2008

56 LAVAL university, 2016. The Manantali dam's installed capacity is of 200 MW (producing ~800 GWh/y) and the Felou run of the river's 60MW. The Guina dam — nearly completed — has a capacity of 140MW and is expected to produce around 600 GWh/year.

57 World Bank, 2015. PAD for the Volta River Basin Strategic River Basin Strategic Action Programme Implementation Project.

**Figure 7 Economic Dependence on Water Resources by Transboundary River Basin in the G5 countries. Based on economic activities located inside the basin.**



Source: World Bank using data from UNEP-DHI and UNEP (2016).<sup>58</sup>

pool, hence electricity produced in one country in the basin often benefits other countries in the same basin and increasingly countries beyond the basin itself. For example, most electricity generated in the Volta basin is produced in Ghana, and is benefitting all countries in the basin, except for Mali. All installed hydropower generation in the Senegal basin is in Mali and shared with Senegal and Mauritania.

**29. The Niger, Senegal, Lake Chad, and Volta River basins have large undeveloped irrigation, fisheries, transport and hydroelectric potential.** It is estimated that about 2 percent of cropland in these basins is irrigated (less than 0.5 million ha, contrasting with 37 percent in Asia) representing approximately 20 percent of the Sahel's irrigation potential.<sup>59</sup> Among the basins, the Niger stands out as one of the most important in Africa with a large potential for infrastructure

development. Existing estimates indicate that between 1–5 percent of the total crop area in the basin is irrigated (0.55–0.9 M/ha). In turn, irrigation potential could reach 1.5–2.9 million hectares with an associated expansion of the total agricultural area — though the caveats described above should be considered.

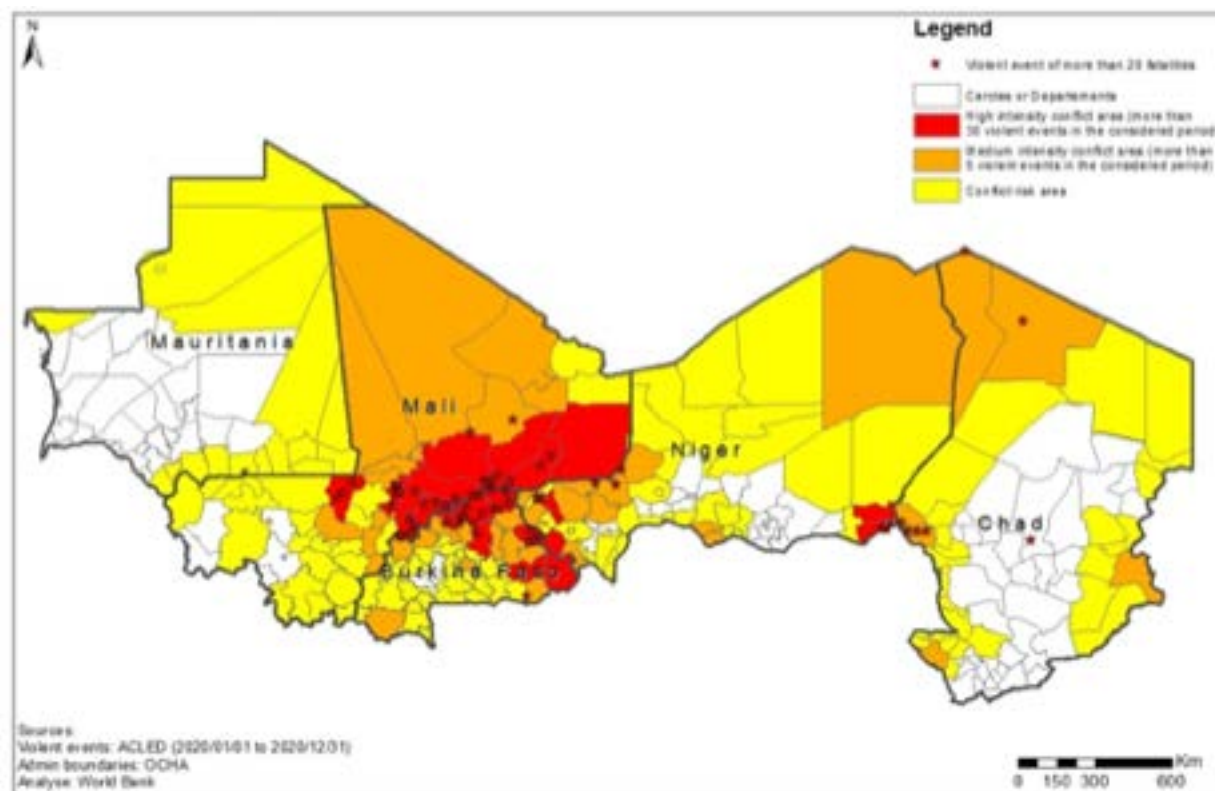
### 1.3. Water as a critical element for improving stability and security in the region

**30. The G5 Sahel is one of the most fragile regions of the world, where civil unrest and insurgency feed the vicious cycle of rural poverty and insecurity.** Extremism is fueled partially by the rising poverty

<sup>58</sup> UNEP-DHI and UNEP (2016). Transboundary River Basins: Status and Trends. United Nations Environment Program (UNEP), Nairobi.

<sup>59</sup> World Bank, 2014. Project appraisal document for the Transforming Irrigation Management in Nigeria Project. Report No. PAD1001.



**Figure 8 Conflict-affected and prevention areas in the G5 Sahel region (December 2020)**

rates, demographic explosion, youth unemployment and deteriorating resource base further increases the population's vulnerability. As a result, across the G5 Sahel region, two thirds of the population live in conflict-risk areas and millions more are unable to find work.<sup>60</sup> All G5 Sahel countries but Mauritania fall into the medium-intensity conflicts category according to the FCS classification.<sup>61</sup> The five countries, with more than 3.5 million displaced people, are also home to the world's fastest growing displacement crisis.<sup>62</sup>

**31. Water insecurity worsens fragility and may trigger or amplify tensions and conflicts.** Today, there is growing global evidence that water challenges exacerbate fragility and conflict.<sup>63</sup> In G5 Sahel water insecurity is a major driver or magnifier of conflicts, where it intertwines with a multitude of fragility drivers such as, structural poverty and lack of economic opportunities,

demographic growth, not-inclusive development policies, and regional instability. The impacts of Covid-19 on the economy, health, and food security have potentiated these fragilities. While achieving water security in fragile contexts may be more challenging because of the weak institutional and policy environment and poor technical and financial capacities, it is precisely here that failure to reach water security can have the most damaging social, political, and economic consequences, increasing fragility even further. In a region where livelihoods and economies depend heavily on water and agriculture, variation in water availability increases vulnerability to the effects of conflict, while the conflict itself restricts access to water sources and can degrade them, creating what is known as a "conflict trap". The most challenging situations are likely to occur in areas under fragile contexts that are chronically water insecure, where water-related shocks (such as drought or floods) or disruptions of water

60 OCHA, 2019. Humanitarian Emergency at Unprecedented Level in Sahel - Burkina Faso | ReliefWeb

61 FY21 List of Fragile and Conflict-affected Situations

62 R4 Sahel Data Platform, 2020

63 Sadoff, 2017. Turbulent Waters: Pursuing Water Security in fragile Contexts; Busby, Joshua, Uexkull, Nina von (2018) Climate shocks and humanitarian crises. Foreign Affairs (November) (<https://www.foreignaffairs.com/articles/world/2018-11-29/climate-shocks-and-humanitarian-crises>).

supplies (such as infrastructure damage) overwhelm government capacity for response and resilience.<sup>64</sup>

**32. In the G5 Sahel region, water insecurity fuels fragility and instability through three main channels:**

Water insecurity can fuel cross-border and regional challenges by for instance (i) leading to environmental migration and pressure on resources in host communities, (ii) diverting pastoralist routes leading to encroachment into cropped areas and ensuing conflicts between farmers and herders (iii) further weakening the citizens' trust in the state due to lack of economic opportunities, thereby legitimizing violent expression of dissatisfaction and grievance.

**1.3.1. Water insecurity induced migration and pressure on resources in host communities**

**33. Land degradation exacerbates water insecurity by reducing soil water retention capacity, increasing runoff and provoking destructive flooding downstream and compounds water insecurity as a trigger of conflict.**

For instance, it was found that land degradation acted as a multiplier in the conflicts in Northern Mali.<sup>65</sup> By eroding natural resources-based livelihoods and income, water insecurity and land degradation generate unemployment, poverty, and resentment, particularly among young, disempowered people who are the most recruitable by groups who fuel existing ethnic and political tensions for their own interests. Lack of investment in basic services, climate adaptive resilience, and livelihood opportunities, can result in outmigration. Many displaced households have been forced to leave behind their cattle or tools and are therefore dependent on host populations for their survival. Non-displaced households in conflict-affected communities have seen local agricultural systems affected by the destruction of farming and irrigations facilities and attacks or thefts of cattle. Water resources management interventions supporting livelihood restoration and climate adaptive income generating opportunities among both the displaced and the non-displaced is therefore critical for a sustainable recovery. The International Military Council on Climate and Security indicates investment in water, food security, and disaster preparedness as key opportunities for global stability and security.<sup>66</sup>

**34. The worsening conditions of wetlands in the Sahel undermines human well-being and compels people to migrate.**

The floodplains and wetlands in the Sahel, including the Ramsar sites of the Niger Inner Delta and Lake Chad are highly productive and biologically diverse ecosystems, fed by seasonal floods. These dynamic wetlands have long been the basis for local and regional economies. Today, millions of people depend on their assets for fish, cattle, food, fuelwood, water, medicinal plants, and crops such as rice. During the dry season, wetlands become a magnet for pastoralists. Lake Chad is an export hub for fish, livestock, and agricultural products and today it plays a major role in regional food security of a hinterland with nearly 13 million inhabitants and two metropolitan centers (N'Djamena and Maiduguri). They also act as a buffer against drought. As migratory waterfowl sites, both the Niger Inner Delta and Lake Chad are listed among the Ramsar Wetlands of International Importance. Yet, flooding in the Niger Inner Delta has receded due to upstream water offtakes. Disputes amongst herders, fishermen, and farmers are increasing. More than one million people could be permanently displaced because of the operation of existing and proposed upstream dams and water diversions. Similarly, the region around Lake Chad remains the poorest and most marginalized part of each respective country. Vulnerable farmers have been facing devastating natural hazards including cyclical droughts and floods over the past decade, abetted by climate change. Since 2014, the functioning of government institutions has been even more disrupted by the rise of the double insurgencies of Boko Haram and the Islamic State in West Africa Province. As a result, in a region that used to feed its population and employ millions, now millions of people depend on humanitarian aid, and suffer from, violent conflict, forced displacement, poor governance, endemic corruption and serious environmental mismanagement.

**35. The influx of populations linked to forced displacement increases the pressure on water resources, with in some cases lack of acceptance by the host communities.**

Fragility-induced displacement puts additional pressure on water resources and services in the receiving communities, aggravating water insecurity and further slowing down urban and economic growth. For instance, protests and violence were triggered by water shortages in Nouakchott in July 2012 as over 70,000

64 Sadoff, C.W., Borgomeo, E., de Waal, D., 2017. Turbulent Waters: Pursuing Water Security in Fragile Contexts. Washington, DC, World Bank.

65 Dal Santo, E., van der Heide, E.J., 2018. Escalating Complexity in Regional Conflicts: Connecting Geopolitics to Individual Pathways to Terrorism in Mali, *African Security*, 11:3, 274-291, DOI: 10.1080/19392206.2018.1505232

66 The World Climate and Security Report 2020. International Military Council on Climate and Security

Malian refugees were seeking asylum in Mauritania, putting pressure on the scarce food and water supplies.<sup>67</sup> In early 2020, the Burkina Faso CMU carried out a portfolio deep dive to reallocate funds towards supporting the Government with emergency service provision in urban centers and their periphery to cope with the wave of internally displaced people seeking safety from the violence in the Liptako-Gourma area. Today, more than 1,000,000 people have been internally displaced in Burkina Faso, putting significant pressure on existing service provision and flooding the labor market, leaving many new arrivals out of work.

### **36. Water insecurity-induced displacements, particularly those due to drought, compound fragility.**

The current context, in addition to the climate of uncertainty prevailing in rural areas slowly degraded by climate change, has been pushing many people to migrate to urban centers. A recent report also indicates that a 1 percent reduction in precipitation is associated with a 0.59 percent increase in the urbanization rate, increasing pressure on water resources and its services.<sup>68</sup> Men's labour migration markedly increases following drought, and in Niger young men between the age of 25 and 35 regularly move to urban centers in response to drought. In Burkina Faso, people living in drier areas were found to be more likely to migrate than people living in areas with higher rainfall availability.<sup>69</sup> Urban centers are considered to be safe, less dependent on economic activities based on natural resources and therefore less affected by natural phenomena. This concentration of population in urban areas is likely to lead to overexploitation of natural resources and water supply networks.<sup>70</sup>

**37. Migration is an important adaptation strategy, but it can lead to conflict between host and migrant communities.** In fragile contexts where armed and violent groups operate, these tensions could trigger further conflicts among communities.<sup>71</sup> For example, the shrinking of Lake Chad in 1980s and 1990s forced ethnically diverse pastoralist communities from the Republic of Niger and other riparian countries to move

further south, heightening conflict over scarce resources among ethnic groups, many of which are armed. Water-related population movement is often difficult to assess because the impacts of slow onset water-related disasters, such as drought, on livelihoods are often delayed, and have many causes, and because multiple drivers affect the decision to move. Drought, like other water-related disasters, cannot be prevented. However, investments in drought preparedness, creation of early warning systems, and diversification of water supply and livelihood sources can protect populations and economies from the harmful consequences of these disasters.

### **1.3.2. Diverting pastoralist routes leading to encroachment into cropped areas and ensuing conflicts between farmers and herders**

**38. Inter-annual water variability and increased competition over land and water resources are creating new forms of conflict between farmers and herders in the Sahel, contributing significantly to the rise in deadly violence in the region during the past five years.** Empirical evidence shows a higher probability of occurrence of water-scarcity-induced conflicts in G5 Sahel as compared to the rest of Africa. A recent found a sharp negative relationship between variations in soil water content and conflict specifically for the countries of the G5 Sahel.<sup>72</sup> The causality link materializes via livelihood channels by disrupting food production and engendering income losses that may give rise or exacerbate existing grievances and thereby increase individuals' willingness to engage in conflict. Depending on the situation, livestock farmers may advance or delay their transhumance movements. Host pastoral areas risk a high inflow of animals, thus increasing the risk of epizootic disease onset, conflicts with local crop farmers, overgrazing and environmental degradation (see Figure 9, for instance in the area of the Niger Inner Delta (centre, green). Likewise, inequalities in water endowments between different

67 Taha, R.M., 2012. "Mali conflict spilling over: Influx of refugees from Mali exacerbates political instability in neighbouring Mauritania." Daily News, Egypt, July 1. <http://www.dailynewsegypt.com/2012/07/01/mali-conflict-spilling-over/>.

68 World Bank, under publication. High and Dry.

69 WGP, 2021. Ebb and Flow: Water, Migration, and Development. Water Global Practice, The World Bank.

70 Majans, J., 2020. The Sahel at the heart of climate change issues. SOLIDARITÉS INTERNATIONALE

71 Ginnetti, J., Franck, T., 2014. Assessing Drought Displacement Risk for Kenyan, Ethiopian and Somali Pastoralists. Technical Paper. Norwegian Refugee Council (NRC)/Internal Displacement Monitoring Centre.

72 Khan & Rodella, 2021. A Hard Rain's a-Gonna Fall? New Insights on Water Security and Fragility in the Sahel



**Figure 9 Pastoral farming in the Sahel (August 2019)**

Source: <https://atalayar.com/en/content/hacia-una-guerra-clim%C3%A1tica-en-el-sahel>

locations and population groups increases the likelihood of conflict breaking out.<sup>73,74</sup> In Niger, the drilling of pastoral wells along strategic transhumant routes that cross agro-pastoral areas is often disputed as sedentary (i.e. farming) communities claim exclusive ownership over land and perceive the construction of a pastoral water point as a form of land expropriation. In such cases, the establishment of the well in question is frequently diverted in proximity of the village and placed under the control of the villagers, which compromises its pastoral use and remains a latent source of conflict.<sup>75</sup> Similarly, the development of boreholes — allowing permanent water availability — has often led to overgrazing of dry season pastures by attracting permanent settlers, who would not respect the resting period of these rangelands and prevent their regeneration. A clear definition of users' rights should be a point of focus along with the definition

of mechanisms to match water access to the actual carrying capacity of the grassland over time.<sup>76</sup>

**39. Whereas, in the past, natural resources-based disputes were largely resolved by social agreements mediated by local leaders, these traditional conflict-resolution mechanisms appear to be weaker today.<sup>77</sup>**

These new zones of conflict between farmers and herders often occur in peripheral areas, often on the margins of state capacity. Here, the presence of jihadists, armed gangs and ethnic militias—all of which manipulate farmer-herder frictions around land and water use — is both symptom and cause of the incapacity of formal institutions to arbitrate and manage localized resource competition. Lake Chad, historically a cultural and commercial crossroad for farmers, herders, fisher(women), and traders of four border countries, is turning in yet another conflict hotspot because of increasing pressure

73 Berman, N., Couttenier, M., Rohner, D. and Thoenig, M., 2017. This mine is mine! How minerals fuel conflicts in Africa. *American Economic Review*, 107(6), pp.1564-1610.

74 Morelli, M. Rohner, D., 2015. Resource concentration and civil wars. *Journal of Development Economics*, 117, pp.32-47.

75 Pratt, D.J., Le Gall, F., De Haan, C., 1997. "Investing in Pastoralism: Sustainable Natural Resource Use in Arid Africa and the Middle East." Technical Paper 365, World Bank, Washington, DC.

76 De Haan, C. (editor), 2016. *Prospects for Livestock-Based Livelihoods in Africa's Drylands*. World Bank Studies. Washington, DC: World Bank. doi: 10.1596/978-1-4648-0836-4. License: Creative Commons Attribution CC BY 3.0 IGO

77 *Strategie Nationale de l'Hydraulique Pastorale*, 2014. Ministère de l'Hydraulique et de l'Assainissement du Niger.

**Box 1 Hotspots of agropastoral tensions are present in all countries of the G5 Sahel.**

- In **Burkina Faso**, they are located in the agro-pastoral zones of the Western, Central, and Centre-South regions.
  - These conflicts occur in many regions of **Chad**, especially in the southern strip (Logone Oriental and Occidental, Tandjilé, Mandoul, Moyen Chari and Mayo-Kebbi), in the Center (Batha) and in the East (Ouaddai).<sup>79</sup> Most conflicts in the Lake Chad area are again generated around access to water and pastures between herding communities (Boudoumas and Peuls, Toubous and Arabs, Mahamides and Peuls). In 2016, 40 Boudoumas were killed in a clash with Peuls on the Nigerian shores of the lake.
  - In **Mali**, agropastoral conflicts are concentrated in the Mopti and Segou regions and south of Timbuktu and have often resulted in violent extremism and community violence. In the Mopti region of Mali, the dismantlement of traditional resource management systems in the flood-recession areas of the Mopti region has created tensions between farmers and herders around the access to transhumance routes and water points. Policies of the last decades favoring agriculture over pastoralism have only exacerbated these tensions.<sup>80</sup> In inundated areas, disrespect of free access to wetland pastures (*bourgoutières*) to herders caused extremely violent confrontations between the villages of Soossobe et Salsalbe in 1993 that resulted in 34 deaths. In most cases, violent confrontations were sparked by disputes over the sharing of water and access to grazing corridors between Dogon and Fulani communities. Conflict and violence escalated between these two groups in the last years and culminated in the massacre of 134 Fulani in 2019 by a Dogon militia.
  - In **Mauritania**, conflicts are concentrated in the Senegal River valley, in the regions of Trarza, Brakna, Gorgol, Guidimakha and Assaba. They concern mainly the 24,000 returnees, mostly from the Haalpular (Black-African) community, who returned between 2007 and 2012<sup>81</sup> and who are claiming back the land they left behind after deportation to Senegal and Mali, which has been redistributed mainly to the Arab community (*Bidhan* and *Haratins*).
  - In **Niger**, violent conflicts over access to resources are extremely widespread in the regions of Diffa, Tillabéri and in densely populated areas namely the southern regions of Dosso, Zinder, Tahoua and Maradi. The most prominent case in Niger are the regular tensions between Fulani (in Niger) and Daoussahak Tuareg (in Mali) pastoralists in the Tillabery region.
- Overall, The Water Conflict Chronology of the Pacific Institute recorded 10 violent conflicts involving water since 2010 in G5 Sahel countries, most of them in Mali.<sup>82</sup>

on and competition for land and water exacerbated by environmental degradation and climate change. The lack of state involvement in an area considered peripheral by both Chad and Niger results in under-provision of basic services and absence or failure of disarmament, demobilization and reintegration processes allowing former rebels, ex-military, and bandits to fill this void. A strong feeling of insularity has developed among its inhabitants. The recently drafted National Strategies for Pastoral Waterworks (*Strategie Nationale de l'Hydraulique Pastorale*) of Mali, Niger, and Chad (those of Mauritania and Burkina Faso are ongoing) recognize the contested nature of access to water and land, pitting sedentary communities against mobile, and propose guidance

for the establishment of social agreements around the development, use, and management of water resources in pastoral areas.

### **I.3.3. Increasing marginalization and weakening citizens' trust in the state**

**40. And where the state is involved, there is often a perception that it has been on the side of farmers through policies of sedentarization and food autonomy, fueling pastoralist grievances of alienation, exclusion, and injustice.** Local level tensions and national grievances of certain ethnic

<sup>78</sup> Evaluation des Risques et de la Resilience dans la Region du Sahel.

<sup>79</sup> Adam, T., 2017. Centre du Mali : enjeux et dangers d'une crise négligée, Centre pour le Dialogue Humanitaire.

<sup>80</sup> Ahmedou, H., 2018. Rapatriés et conflits fonciers dans la vallée du fleuve Sénégal: Thiambène, les manguiers de la discorde. In : Foncier, droit et propriété en Mauritanie. Enjeux et perspectives de recherche, Rabat, p. 151-172.

<sup>81</sup> The Pacific Institute. The Water Conflict Chronology, <https://www.worldwater.org/water-conflict>.

groups underrepresented or excluded from political decision-making can be instrumentalized by religious extremist groups to rally legitimacy and supporters for their cause. Box 1 presents hotspots of conflict between farmer and herders in the G5 countries. The Sahel Alliance recognizes the importance of managing these conflicts, which is one of the key objectives of its pillar on Agriculture, Rural Development, and Food Security. The Regional Sahel Pastoralism Support Project (PRAPS I, P147674) is successfully applying the social engineering approach facilitating multi-actor and multi-scale consultations to arrive at social agreements on the use of common resources—namely, a social charter reflecting all the points of consensus on which all parties—local actors, both permanent and seasonal, beneficiaries, administrative and customary authorities—have agreed and are committed to.

#### 1.3.4. Ensuring a do-no-harm intervention

**41. The challenge when developing new water sources in fragile situations with inter/intra-communal tensions over (scarce) natural resources, is to avoid exacerbating existing conflicts or create new ones.** In view of the many ways in which water insecurity can drive FCV outcomes, well-designed and implemented investments in water security can play a critical role in improving stability and mitigating the risk of conflicts in G5 Sahel. Yet evidence indicates that large irrigation projects may also become magnets of conflict, particularly in fragile, resource-scarce settings. For instance, a recent study found a higher incidence of conflict in irrigated areas, as compared to non-irrigated areas, amid increased fragility in the aftermath of the Arab Spring in the broader West African region.<sup>82</sup> While irrigation helps stabilizing agricultural production vis a vis rainfall variability, irrigation development also entails land redistribution and differentiated access to benefits. Irrigated plots may then become a high-value target of conflicts. Similarly, past experiences in several Sahel regions suggest that creating new resources can also provoke an increase in local tensions and sometimes violent conflict (see Box 2).

**42. Therefore, it is critical that these investments are based on sufficient preparatory work to understand existing livelihood and tenure systems**

**and power dynamics around the control of land and water.** It is thus crucial to thoroughly consider possible scenarios of future configurations of water users, as a consequence of developing a new (permanent) water asset, such as new settlements, resource appropriation by local chiefs, or exploitation by external private actors. Equitable distribution of project benefits is mandatory to move from mere “do-no-harm” to proactive “peacebuilding” while enhancing stability and reducing risks of exclusion, grievance, and conflict. It is equally important to understand local traditional conflict resolution mechanisms as a key element to be leveraged in project design and management

#### 1.3.4 Climate change could further increase tensions between different water users

**43. Climate projections for the region are dire and likely to increase tensions between different water users.** Despite large uncertainties, it seems that rainfall variability and temperature will increase, and that the rainy season will shorten, with a shift in peak flows of the main Senegal and Niger rivers. Moreover, despite uncertainties in future rainfall patterns, recent findings point towards a long-term declining rainfall trend. This may be partly due to deforestation along the Guinean Coast, which has wider hydrological impacts by reducing evaporation and recycling of moisture available to travel northwest to generate rainfall in Wester Sahel.<sup>83,84</sup> Some countries will experience up to 20 percent reduction in water availability.<sup>85</sup> This means that the water we have today might not be there in the future. At the same time, water demands will increase with higher temperatures (when it is needed, where it is needed), particularly from agriculture and the natural environment, which will make water evermore the constraining factor in agricultural production. Recent literature indicates that future interventions will need to be framed within a scenario of an average 40–110 mm less rainfall by 2040 relative to today, and more frequent and intense droughts and floods. The Intergovernmental Panel on Climate Change predicts that agricultural yields will fall by 20 percent per decade by the end of the 21st century in some areas of the Sahel. Climate change also influences the choice of routes taken by pastoralists with their herds, which is

82 Khan & Rodella, 2021. A Hard Rain's a-Gonna Fall? New Insights on Water Security and Fragility in the Sahel.

83 Sheil, D., 2018. Forests, atmospheric water and an uncertain future: the new biology of the global water cycle. *Forest Ecosystems* 5:19.

84 Ellison, D., Speranza, C.I., 2020. From blue to green water and back again: Promoting tree, shrub and forest-based landscape resilience in the Sahel. *Science of Total Environment* 739.

85 World Bank, Climate Knowledge Portal



**Box 2 Examples of close relationship between the increase in resources and the consequent increase in tensions**

**Case 1- Central Mali:** During an operation to support livestock farming in the Mopti region new wells rendered areas previously devoid of water more attractive. The wells drew in Dogon farmers from central Mali, who settled there, initially with the permission of Fulani herders whom the state often recognized as having land use rights. Over time, the number of farmers grew, and they began asserting their rights over the land surrounding the wells, which had been dug for the herders. Tensions between herders and farmers worsened, as neither the state nor “traditional” local authorities seemed capable of regulating land use in a peaceful and consensual manner

**Case 2- Soum province of Burkina Faso:** The “Riz Pluvial” development project helped increase rice production volumes in the municipality of Belehédé. But this project also affected the local demographic and political balance

by drawing in non-native farmers, mostly from the Fulsé and Mossi ethnic groups. As a result, Fulani owners who are often nomadic herders felt pushed off the land without adequate compensation. The non-native populations also sought to bypass the traditional local authority, in this case the emir of Tongomayel, by appointing their own village chiefs. Amid these tensions, Fulani herders have approached jihadist groups, who are known for rejecting state decisions and helping people who support them gain access to land.

In neither of these examples, it seems that the right mechanism to resolve dispute over access rights were in place — it shows how important it is to understand local dynamics and conflict resolution mechanisms to avoid doing any harm and achieving the intended objectives to benefit the local populations.

likely to lead to increased tensions between them and farming communities.

## **I.4. Improving water security by increasing storage is essential for the resilience of the G5 Sahel population to climate variability and change**

**44. Given the large spatial and temporal variability of Sahel’s water resources, diversifying water resources and increasing recharge and storage are critical climate-resilient solutions.** In the period 1980–2015, 107 million people were affected in SSA due to droughts causing US\$ 3.4 billion in damages with high social, environmental, and economic costs. The warming trends create an increasing risk for long-term droughts in Africa, with some estimates indicating megadroughts could extend for up to 100 years in Sub-Saharan Africa.<sup>86</sup> As temperatures are projected to

increase 1.5 times faster in the Sahel than the global average, increased water scarcity is likely to reduce crop yields and livestock productivity, and further affect food security and food prices.<sup>87</sup> Surface water’s ecological and environmental services will be impaired unless measures are taken to curtail demand and to increasingly mobilize groundwater. It is estimated that, in Mali alone, an area of between 331,000 to 787,000 ha could be irrigated from renewable groundwater.<sup>88</sup> However, with booming groundwater demand, its governance and management need to be strengthened. This includes both the institutional level with upgrading existing national water laws and policies, and the technical level, to improve the efficiency and quality of groundwater development (Box 3).

**45. While storage is essential for increasing the resilience of Sahelian population to already-changing rainfall patterns, current storage is limited and often poorly performing and in need of rehabilitation.** In the Sahel, the actual storage capacity decreased by 5–10 percent from 1990–2010.<sup>89</sup> According to a recent study of the water sector in Burkina Faso,<sup>90</sup> sedimentation is rampant as it affects smaller and larger dams alike

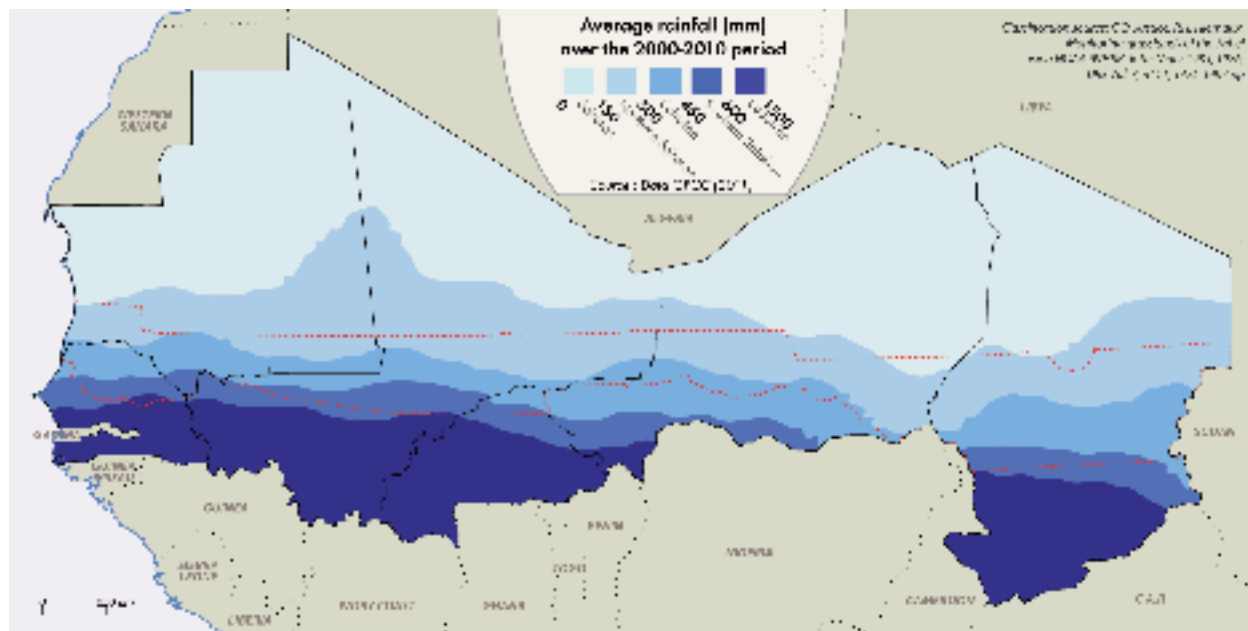
86 Ault, T.R., Cole, J.E., Overpeck, J.T., G. T. Pederson, G.T., Meko, D.M., 2014. Assessing the risk of persistent drought using climate model simulations and paleoclimate data. *Journal of Climate* 27, 7529–7549.

87 <https://blogs.worldbank.org/nasikiliza/towards-more-sustainable-future-sahel-region>

88 Altchenko, Y., K. G. Villholth, K.G., 2015. Mapping irrigation potential from renewable groundwater in Africa – a quantitative hydrological approach. *Hydrology and Earth System Sciences* 19(2), 1055–1067.

89 Wisser, D., Frolking, S., Hagen, S., M. F. P. Bierkens, M.F.P., 2013. Beyond peak reservoir storage? A global estimate of declining water storage capacity in large reservoirs, *Water Resour. Res.*, 49, 5732–5739.

90 Burkina Faso: Water for Development to 2030: Sector Note, 2021.

**Figure 10 Average rainfall (mm) in G5 Sahel (estimated, 2000-2010)**

Source: CIRAD & FAO, 2012. Information system on pastoralism in the Sahel: Atlas of trends in pastoral systems in the Sahel 1970-2012. (p.8)

across the country and calls for a rethinking of design principles as well as careful construction. The water resources management plan of the Nakanbe basin – with the Mouhoun basin the main source of surface water of Burkina Faso – states that 159 dams are in a state of disrepair, mostly due to sedimentation; others, conceived as multi-purpose, today only serve one use. Similarly, the Government of Mali highlighted the need of rehabilitation and maintenance of the Manantali, Sotupe2, Markala, and Selingue dams — though national investments, key for water security in the region. In the G5 Sahel, multipurpose storage can significantly help increase regional energy access, improve flood and drought control, and secure access to water for different uses. Aware of this, countries are moving forward with large infrastructure investments in storage with continued support from financiers (e.g. Koukoutamba and Gourbassi in the Senegal river basin, Fomi and Taoussa in the Niger River Basin, etc.). However, they are complex investments that require careful planning and management, especially in terms of operations to meet the needs of diverse set of water users at and downstream of the projects.

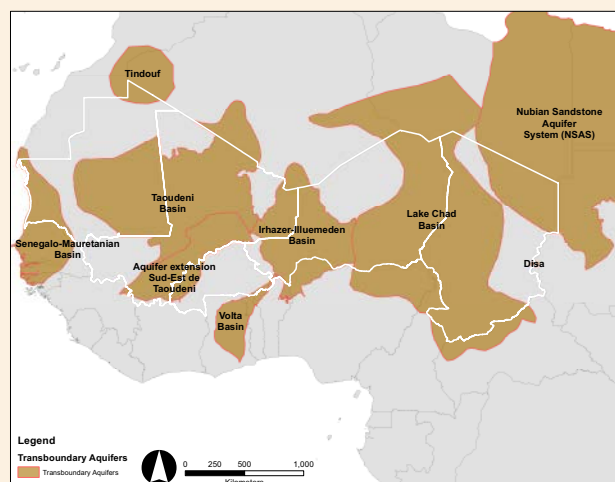
**46. There are many options for increasing storage in the Sahel, ranging from aquifer recharge,, to increasing soil water content, to small-medium and large dams, with varying levels of complexities.** Given the importance of increasing storage in the Sahel, and wary of the challenges embedded in large scale infrastructure, the Bank may want to support small scale decentralized storage as a more climate-resilient and less socially and environmentally sensitive solution. In the Sahel, there is large untapped potential for water harvesting to increase storage in aquifers through in-stream solutions, in soils through in-situ water harvesting, or in surface water reservoirs by harnessing runoff. Yet, to guarantee hydrological gains and to avoid negative downstream effects, these smaller scale interventions need to be grounded in sound hydrological assessment at the (sub)catchment scale. Moreover, in a context of longer cycles of alternating dry and wet years, water buffering needs to be planned with a multi-year perspective alternating recharge cycles during wet periods and abstractions in dry periods. Very roughly, the type of water harvesting and storage is dictated by isohyets.<sup>91</sup> In hyper-arid contexts (<250mm), buffering in aquifers is possibly the most efficient way to store water for its low/null evaporation losses and to avoid

91 A line drawn on a map connecting points having equal rainfall at a certain time or for a stated period

### Box 3 Groundwater, a strategic resource for G5 Sahel countries that calls for strengthening knowledge and governance.

There is little quantitative information on the largely transboundary groundwater resources in Western Sahel, and little is known about the physical extent, accessibility, and development potential of groundwater in the region. There are very few groundwater systems in the Sahel where both the recharge and discharge components of the groundwater balance have been determined.<sup>94</sup> To respond to knowledge and expertise gaps around groundwater resources mobilization and management in the Sahel, the Bank is currently conducting the Sahel Groundwater Initiative, whose objective is to evolve a framework to inform a more efficient and sustainable management of the groundwater resources and to improve the capacity of the key players on groundwater issues in the Sahel.

With booming groundwater demand, both its governance and management need to be strengthened. This includes both the institutional level with upgrading existing national water laws and policies, and the technical level, to improve the efficiency and quality of groundwater development. National groundwater governance frameworks in Sahelian countries usually need either review and upgrading of existing water laws and policies or completing them with new regulations. Most of the necessary guidance and tools for such sound governance were developed as a Global Framework for Action consisting of a set of policy and institutional guidelines, recommendations and best practices designed to improve groundwater management at country/local level, and groundwater governance at local, national and transboundary levels. Integrating climate variability aspects into water laws and policies (e.g., drought and flood management plans, provisions for Managed Aquifer Recharge schemes), strengthening national meteorological, hydrological, and



groundwater-monitoring networks, and in particular, strengthening links between groundwater decision-makers and meteorological institutions, are crucial measures to be specifically targeted for improving groundwater governance with reference to climate change and growing resource demand. This national governance shall also fully acknowledge the international nature of the regional aquifer systems covering the Sahel. However, groundwater is still poorly integrated into the trans-national level IWRM structures such as those established for the Senegal river basin, the Niger river basin and the Lake Chad basin. At the national level, groundwater is also largely unregulated and rarely included in the legal framework. In Eastern Africa, the World Bank is spearheading a regional program on transboundary groundwater cooperation, the Horn of Africa Groundwater for Resilience Program (P174867).

water contamination that would otherwise occur in surface water storage facilities. The Bank is currently supporting the consultancy assignment “Mobilizing Water Resources through Watershed Interventions in the Sahel”, whose objective is to seek practical guidance on how to implement small scale storage interventions in Western Sahel in a way that maximizes effectiveness and hydrological dividends, and minimizes threats associated with fragile/conflict environments.

**47. This said, while increasing storage is a necessary condition for resilience, we need to be realistic: the Sahel is a dry environment with limited carrying capacity in terms of people, livestock, and crops.**

Crops are water demanding and not all areas are suited for crops and in order to avoid overgrazing, water must remain the limiting factor in areas with <250mm average annual rainfall. Figure 10 shows the distribution of rainfall over a ten-year average, which large share of the Sahel experience less than 300mm of rain.

### 1.5. What have we learned from WB experience in the G5 Sahel?

**48. Though water security clearly contributes to resilience and conflict prevention, an opportunity is being missed to tackle these three elements in tandem**



**through regional World Bank engagement in the G5 Sahel.** Current World Bank engagement in the G5 Sahel region primarily focus on sectoral approaches linked to infrastructure, food security, livestock, and human development. This includes providing a wide range of support services, like water supply and sanitation, means of production and livelihoods, community infrastructure, increased market accessibility. Figure 11 maps out some of the World Bank's active sectoral investments in the region (based on the GEMS/KoboToolbox database, currently being completed). The total estimated World Bank commitment in the region amounts to over US\$8.5 billion. However, to date, the WBG's response to a regional crisis has been predominantly national (86 out of 109 projects in Western Africa are national,<sup>92</sup> for 57 percent of total commitments) and single sectoral (76 percent). The existing pipeline is not much different, with less than 25 percent of projects acknowledging multi-sectorality and regional projects accounting for 17 percent of the total pipeline, for 36 percent of total commitments. From a country perspective, the ministries that need to translate the integrated approach on the ground remain siloed, and this is an additional significant challenge for multi-sectoral coordinated interventions on the ground. Therefore, very frequently the types of intervention and level of implementation across different countries have been uncoordinated, posing limits on curbing the transnational dimensions of FCV driving factors, including water security as one fundamental driver. The GEMS team is doing a tremendous job in compiling a database detailing the intervention areas of each project, aiming at — among others — improving coordination at our portfolio level. Similarly, the Sahel Alliance also has a geo-referenced database listing the projects of its partners, though not at such a high level of granularity as the GEMS/KoboToolbox.

**49. Moreover, the link between water security, resilience, fragility and conflict remains largely unrecognized in regional policies and programs.** Overall, there is a deficit of cross-border dialogues on coordinated management of water resources and regional harmonization of policies and plans regulating water uses, for instance pastoral water strategies. Conventions on transborder transhumance committing Member States of subregional and regional institutions (ALG, CILSS, WAEMU and ECOWAS) have been ratified, but major efforts remain in the effective application

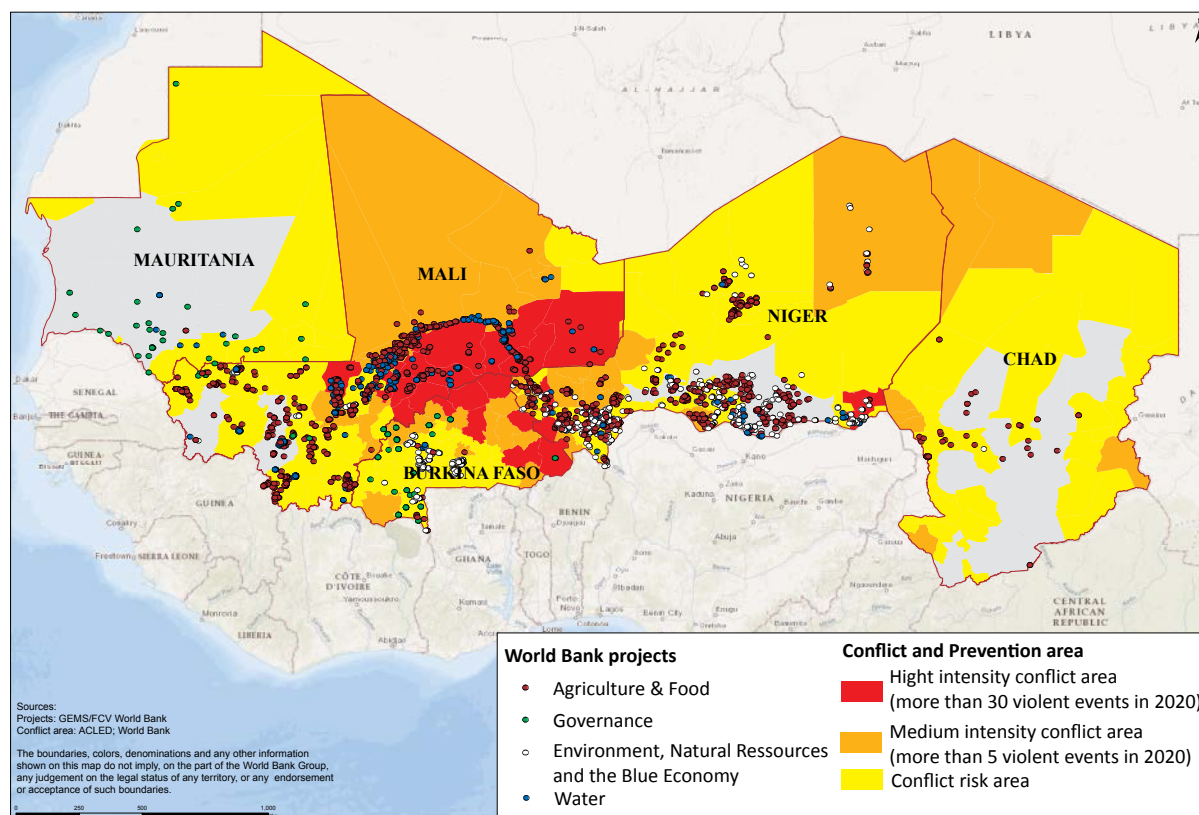
of these initiatives. On the Bank side, while the link between water security – through both its productive and destructive dimensions – and resilience, fragility, and conflict is increasingly reflected in the growing proportion of water-related investments in the World Bank national portfolios (i.e., the US\$400m Niger Integrated Water Security Platform Project (Niger-IWSP, P174414) under preparation — see Box 6 — and a Water Security project in Burkina Faso, whose preparation will start in July 2021), it is seldom directly acknowledged in regional policies and programs. There are currently no regional programs on water security. The Sahel Alliance, key coordinating entity for development interventions in the region, does not have a specific pillar on water security, and water — though fundamental for the pillar on *Agriculture, Rural Development and Food Security* — is directly mentioned only under the pillar on *Decentralization and Basic Services*. Similarly, the World Bank's Risk and Resilience Assessment for the Sahel, prepared under the aegis of the Sahel Alliance, mentions water mostly when discussing access to land and other extractive natural resources, or in terms of access to potable water as a basic service.

**50. Given the countries' high economic dependence on transboundary waters, engaging in transboundary water management and cooperation continues to be important as it helps mitigate risks to World Bank investments by reducing exposure to transboundary issues.** The dialogue on transboundary water management and development is however likely to further decrease once the two ongoing transboundary water projects close (PGIRE closing in December 2022, and the Kandadji project in 2027). Yet, even in our portfolio, exposure to transboundary water issues is high. Exposure to transboundary issues is defined here as a project triggering the application of the Operational Policy on Projects on International Waterways (OP 7.50), meaning that it can have implications for or be affected by transboundary hydro-political decision making and water management, and associated risks. In G5 Sahel countries, 15 (out of 138) active and pipeline projects across all practices are exposed to transboundary issues, representing 15 percent of total financial commitments in these countries (1.45 bn US\$), and 16 percent of the IPF portfolio. Expectedly, the majority of projects triggering OP 7.50 falls within the Water Global Practice (with 52 percent of commitments exposed to transboundary water issues) followed by

<sup>92</sup> We considered the regional projects covering at least one country of the G5 Sahel, and national projects in all five countries.

<sup>93</sup> Van Der Wijngaart, R., Helming, J., Jacobs, C., Garzon Delvaux, P.A., Hoek, S. and Gomez y Paloma, S., 2019. Irrigation and irrigated agriculture potential in the Sahel: The case of the Niger river basin: Prospective review of the potential and constraints in a changing climate. JRC Technical Report.

**Figure 11** Spatial repartition of WBG portfolio mapping and conflict/prevention area in 2020, by key water and water-related sectors (the database is not yet complete)



Agriculture (42 percent). Yet, the connecting nature of water implies that also a share of the commitments of the Urban, Environment, and Social Protection practices are affected, respectively, 28, 21, and 21 percent. This stresses once again the importance of continuing World Bank engagement in transboundary water to support cooperation around its planning and management and reduce negative spill-over effects.

**51. In addition, to solve the full spectrum of water security challenges that the G5 Sahel faces today, it is important to diversify the implementation agencies, rather than reflexively recurring to RBOs.**

As the recently concluded retrospective on World Bank engagement on transboundary waters in Western Africa explored, traditionally, RBOs have been the main World Bank counterparts for regional water projects in Africa, in name of the implementation of principles of Integrated Water Resources Management (IWRM), with mixed

results. In the decades since its first popular articulation in the Dublin principles and then at the Rio conference (1992), not only at the Bank but globally, IWRM has become a basic goal of water resources management. Eighty percent of the countries worldwide are now reported to have IWRM principles in their water laws, and two-thirds have developed a national IWRM water plan. An important element of this implementation experience is the emphasis on the establishment and strengthening of a dedicated IWRM organization – hence the strong emphasis in World Bank engagement in Western Africa (and worldwide) onto the strengthening of River Basin Organizations (RBOs), like Senegal River Basin Organization (OMVS) and the Niger Basin Authority (NBA). However, the record of success of these dedicated WRM organizations has been overall very low, as the recently completed *retrospective* points out. Many are only partially able to implement their agenda, and with few notable exceptions, member states are reluctant

to empower RBOs beyond what is necessary to secure their direct interests.<sup>94</sup> In the G5 Sahel region, only the Senegal River Basin Organization is able to finance itself and water developments and management is effectively coordinated among the riparian countries. While RBOs may not be best-placed to address the complexity of water security challenges in the G5 Sahel and their interconnectedness with a much wider range of societal and economic problems, they nevertheless remain essential for many key water resources management functions – decision-making over large infrastructure, transboundary information sharing and dialogue, regional drought/flood alert systems, controlling pollution, etc., and as such a key stakeholder in regional water security.

**52. At the same time, today specific water resource management issues do not always concern the full river basin or watershed.** The river basin as a decision-making and management unit therefore may not always be the most conducive one to deal with all specific resource allocation issues.<sup>95</sup> Real negotiation is driven by interests and incentives and takes place at different scales, be it within or between states; management functions tend to be spread over local, national, regional institutions. Specific instances of successful WRM involving bi or tri-lateral cooperation (see Box 4) show that it should be possible to develop a more outcome-oriented, interest-driven, and flexible approach to IWRM by building collective action and cooperation around specific sub-basin and cross-border issues (or problems). A problemshed – as opposed to a generic watershed approach – could be understood as a spatial unit where issues and actors unite, and around which collective action can be organized due to proximity and more pronounced shared interests between neighboring regions or countries.<sup>96</sup> Nonetheless, it is important to emphasize that the watershed/basin remains the logical physical level for managing water resources, but adopting a problemshed perspective allows for more flexibility in selecting partnerships and implementation arrangements based on the political economy and capacity to deliver. Thus, while a problem-driven approach does by no means preclude a role for RBOs, the Bank should consider a broader set of

implementing partners to fit the specific realities on the ground. Moreover, it would allow RBOs and their partners to focus on areas where change is feasible and on specific (sub-)regional problems that can be used to build cooperation and develop operational programs. This requires a far greater understanding of the interests and incentives behind national decisions and positions, member states' resistance to reform, and their reluctance to engage.<sup>97</sup>

**53. The retrospective also concludes with a plea to increase support to national water institutions, which play a key role in regional and national water security.**

Sustainable water management and development, and service delivery are fundamental pillars of socio-economic development and conflict management, including peace-keeping and regional stability. Strong national institutions can ensure appropriate management and regulation of water resources, as well as financial sustainability of service providers. Strong institutions are also able to produce and enforce regulations like land zoning, land rights, and housing/ grazing policies to secure a more equitable access to water by all users and the long-term sustainability of water uses. Beyond land policy, agricultural and energy subsidies, social protection, and trade policy all have fundamental roles in enabling or hindering the impacts of water policy, and hence have to be considered when developing responses to complex water security challenges at the national level.<sup>98</sup>

**54. Though institutional reforms to improve public service delivery remain a common theme in water sector projects and programs, public agency staff have rarely been considered to be key stakeholders.**

Reforms typically include a range of structural measures focusing on making systems and processes more transparent, accountable, and equitable. Increasingly, attention has also focused on engaging communities as stakeholders in the design and implementation of programs to achieve better results. However, public agency staff – particularly front-line staff – have rarely been considered key stakeholders, let alone “intervention points.” This pattern remains despite a commonly shared

94 Medinilla, A., 2018. African river basin organisations from best practice to best fit. DISCUSSION PAPER No. 236. Political Economy Dynamics of Regional Organisations in Africa.

95 K.A. Daniell, O. Barreteau. Water governance across competing scales: coupling land and water management. Journal of Hydrology, Elsevier, 2014, 519, pp.2367–2380. [ff10.1016/j.jhydrol.2014.10.055](https://doi.org/10.1016/j.jhydrol.2014.10.055). fffhal-01122042f

96 Mollinga, P.P., Meinzen-Dick, R.S. and Merrey, D.J., 2007. Politics, Plurality and Problemsheds: A Strategic Approach for Reform of Agricultural Water Resources Management. Development Policy Review 25, 699–719.

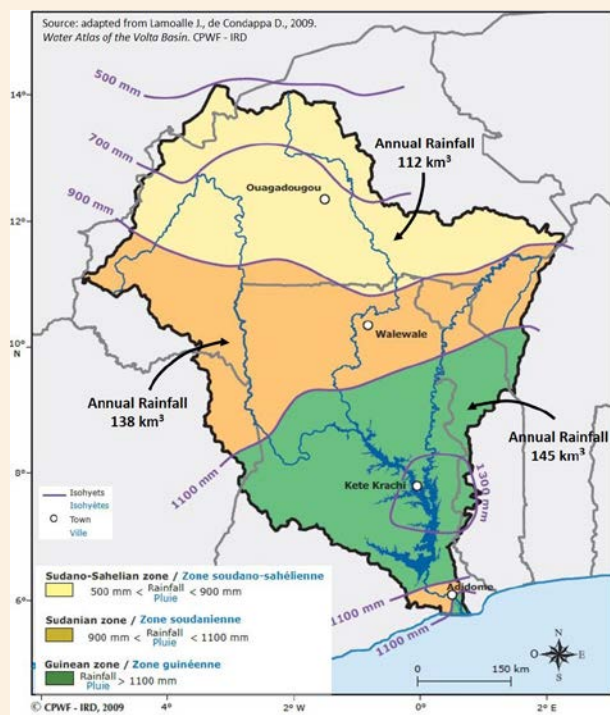
97 Medinilla, A., 2018. African river basin organisations from best practice to best fit. DISCUSSION PAPER No. 236. Political Economy Dynamics of Regional Organisations in Africa.

98 WGP, 2021. Water in the Shadow of Conflict: Water, forced displacement and conflict in the Middle East and North Africa. Water Global Practice, The World Bank (forthcoming).

#### Box 4 The Volta Basin: an example of effective bilateral coordination: the management of the Bagré and Akosombo dams

The Convention providing the legal basis for the creation of the Volta Basin Authority (VBA) was adopted in 2007 by the basin's six riparian countries, and the VBA itself was created in 2012. More than a decade later, the benefits for its member countries remain limited. Several reasons are responsible for this performance, not least the basin geography which is not conducive to basin-wide transboundary cooperation: First, there is a clear imbalance in the contribution of the riparian countries to the basin. Eighty-five percent of the basin area falls under the national boundaries of Ghana (42percent) and Burkina Faso (43percent); second most of the basin is drained by three independent river systems before they converge very much downstream (about 100 km from the basin outlet in the Gulf of Guinea) to form the Volta River, it makes many transboundary issues and interests limited to two or three countries that share a common sub-basin and third, most rainfall and runoff occur downstream, limiting the dependency of downstream riparians on the water flows coming from upstream countries. This may explain the late start in the transboundary cooperation process.

However, this has not precluded Burkina Faso and Ghana that share most of the basin to collaborate at a bilateral level. This relationship has been characterized as “somewhat cordial” until 1998 when Ghana experienced energy crisis due to the reduced level of water at the Akosombo dam — and blamed Burkina for increasing water withdrawals (less rainfall was the reason). Another issue that fosters collaboration between the 2 countries were the occasional spills from the Bagre dam built in 1992 in Burkina Faso which were believed to exacerbate flooding in Ghana. In the end, the two countries agreed that Ghana would provide power to Burkina to reduce its need to build dams in the Volta basin. Interestingly, before the creation of the VBA, in 2004 Ghana and Burkina-Faso had signed a Joint Declaration, which acknowledged both countries’ common environmental and water issues and expressed a desire to collaborate on integrated management of the shared water.



And while VBA was being established, in 2005 and 2006, Burkina Faso and Ghana developed a “Code of Conduct for Sustainable and Equitable Water Resources Management of the Volta Basin between Burkina Faso and Ghana”. This is a non-conventional international collaborative instrument — a rarity in shared water resources management in West Africa.<sup>99</sup>

Today, hydro-meteorological data continues to be exchanged between the 2 countries, basically to assist in dam operations for the generation of power at Akosombo, Ghana. In the case of possible spilling from Bagré, information is transmitted from the Société Nationale d’Électricité du Burkina Faso (SONABEL) to the Volta River Authority in Ghana which in turn relays the information to its regional offices in the affected areas.

belief and significant research<sup>100</sup> showing that the presence of committed and motivated public servants is a key determinant in improving the performance of government agencies. In April 2019, the World Bank Water Global Practice embarked on an two-year

ASA (P169848) initiative to operationally validate an innovative approach called Field-Level Leadership (FLL). FLL leverages the motivation and behavior of public agency staff as a means to improve performance of water agencies. FLL constitutes a set of interventions

99 Garane, A., 2006. Study on the Evaluation of the Role of the Relevance of the 1997 UN Watercourses Convention for the Reinforcement of Transboundary water Related Co-operation and Conflict Management in West Africa

100 Dilulio and Dilulio (1994), Grindle (2004), Leonard (1991 and 2010), Pascale and Sternin (2010), Tendler (1998)



aimed at identifying and supporting a vanguard group of change champions in public agencies, leveraging their initiatives and energy to transform the internal culture and lead improvements in service delivery outcomes. FLL is based on the premise that such champions may be in the minority but are not rare; that they exist at all levels in the organization; that they can be systematically identified and that their potential can be tapped. Originally developed by a group of public servants in the Government of Tamil Nadu in southern India, FLL has since then been systematized and successfully rolled out through the World Bank-financed projects in 12 different public agencies. While the FLL approach addresses an important gap in the institutional reforms tool kit and has broad applicability across public water agencies, as yet it is not available widely. To date, the uptake has been limited primarily by a relative lack of awareness and systematic evidence of FLL effectiveness, but this situation is beginning to change now (see Box 5), as more results on FLL impacts become available from the recent implementation experience.

**55. Hence, given the region's investment needs and the regional importance of water security to address the ongoing crisis, there is considerable scope for WBG to scale up water-centered development support to the G5 Sahel countries - through a regionally coordinated approach to tap on potential regional synergies, including improved coordinated management of transboundary waters.** Thus, there is a need for WBG to employ localized and regional approaches concomitantly to (i) invest in water security in fragility hotspots as part of post-crisis recovery; (ii) consolidate support to local communities and weakened institutions, experiencing heightened pressures from the influx of displaced populations — often centered around access to water; (iii) support zonal development, focusing on structuring investments with cross border spill-over effects, including reducing migration by improving livelihood opportunities; and (iv) support national monitoring and regulation of water resources and v) establish regional data and monitoring mechanisms promoting regional stability, ranging from data on water resources, regulation on water uses, to databases on pastoral water points.



A woman-operated ONEA standpipe in Ouagadougou, Burkina Faso.”

## II. FORWARD LOOK

**56. In the Sahel, water is central to socio-economic development.** Today, climate change and soaring demands are adding pressures on economies and livelihood systems dependent on already depleted and degraded water resources. Access to water is often one of the principal, if not the main, magnifiers of conflict. Since the potential of the main surface transboundary water resources is far from being fully exploited, regional coordination for their development and management needs to be improved, particularly in the Niger River Basin that is shared by four out of five G5 Sahel countries. However, even at the smaller, local, scale, several challenges around access to water resources need to be addressed in a coordinated manner, in order to ensure that the full range of benefits are realized, including across the border or even regionally. The changing availability of water paired with the increased fragility of the region suggests that our future engagement in regional water security will require a paradigm shift.

**57. Between January and April 2021, and based on the information collected in Part I, the team consulted with national and regional clients, CMUs, different donors, and colleagues in different Global Practices on what key elements a new engagement on water security in the region should include, to effectively address via the water lens key regional challenges such as environmental migration, conflict, and fragility.** Based on the feedback received and the analysis of both the context and our portfolio and planning documents of the different clients, fourteen Guiding Principles (GPs) emerge to guide the design of future engagement on regional water security in the G5 Sahel. The final section then describes a proposal for a potential regional program on water security in the G5 Sahel. Including a preliminary list of priority investments proposed by the clients (*low hanging fruits*), often out of strategic national and regional development plans (summarized in Table 2), and a qualitative analysis of potential counterparts (summarized in Table 3).

### II.1. 14 Guiding Principles for a Regional Program on Water Security in the G5 Sahel

**58.** To reflect the different scales of water security challenges and thus diversify World Bank engagement in transboundary cooperation, the fourteen GPs are divided in i) cross-scale principles such as the overarching engagement approach covering both the local/cross-border and regional levels, and proposed implementation arrangements for the whole program, as well as other principles related to data management and institutional strengthening; those related to (ii) how to design local interventions which realize the full span of benefits, including at cross-border and regional levels (for instance, improved water services (for instance, improved water services for host communities and pastoralist water points in the areas crossed by transhumant groups); and (iii) how and where to engage in improving regional coordination for water security (for instance, for planning and management of large infrastructure on shared water resources).

#### Cross-scale interventions



**Guiding Principle 1.** In the G5 Sahel region, the nature of the challenges the region faces calls for a drastic shift in World Bank engagement in water resources

**management, from normative thinking to a problem-driven approach to water security and transboundary water management.** The problem-driven, or *problemshed approach*, pursued around articulated shared interests and focused on actionable interventions and impact around one or more specific challenges, can help identify the appropriate level of dialogue and governance<sup>101,102</sup> and has thus a higher chance of leading to water security. Adopting a problem-shed instead of a normative IWRM approach,<sup>103</sup> allows to move away from prescriptive best practices to fully appreciate political

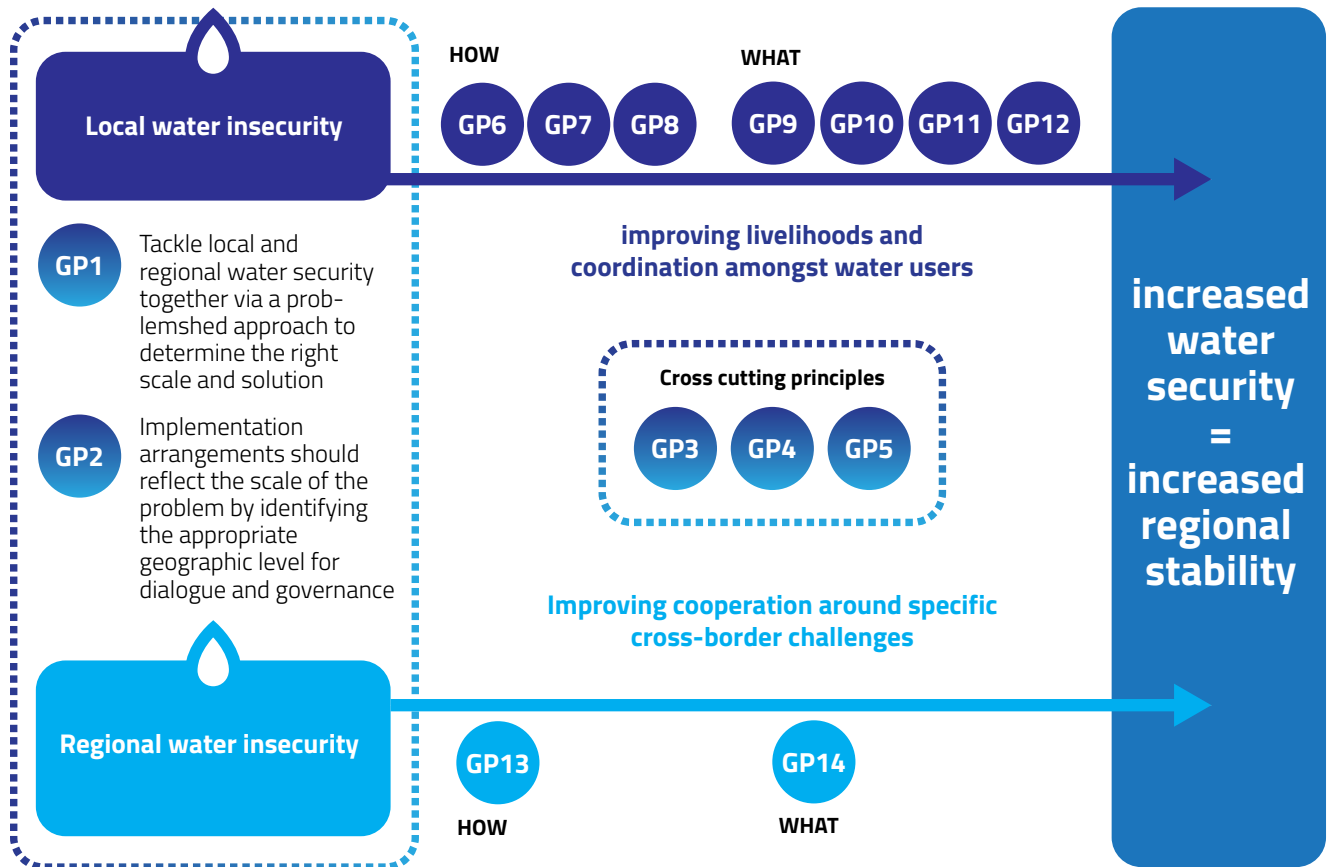
101 Daré, W., Venot, J-P., Le Page, C., Aduna, A., 2018. Problemshed or Watershed? Participatory Modeling towards IWRM in North Ghana. *Water* 10(6):721.

102 Hanasz, P., 2017. Muddy waters: International actors and transboundary water cooperation in the Ganges-Brahmaputra problemshed. *Water Alternatives* 10(2), 459-474

103 It is important to emphasize that the watershed/basin remains the logical physical level for managing water resources, but adopting a problemshed perspective allows for more flexibility in selecting partnerships and implementation arrangements based on the political economy and capacity to deliver.

**Figure 13 Summary of the Guiding Principles and “Theory of Change” of their impacts on regional stability**

Water is the backbone of the fragile socio-economic development in the G5 Sahel and its insecurity fuels instability in the region.



**GP3** Strengthening both national and regional water institutions

**GP4** Ensure coherence between key national public policies (Agricultural, local dvp, land policies,...)

**GP5** Innovation and technology as part of improving water security in fragile areas, and monitoring resources at the higher scale

**GP6** Integrated Territorial Approach

**GP7** Include red zones in intervention areas

**GP8** Pilot phase and strong analytics,

**GP9** Water needs of pastoralists

**GP10** Improving performance of existing water infrastructure (storage, irrigation, WSS)

**GP11** Development and implementation of viable and context-specific irrigation strategies

**GP12** Investing in catchment-based WRM and SLWM Improving access to basic services

**GP13** Place large cities as users within the catchment

**GP14** Leverage the Bank's convening power for large transformational infrastructure investments.

economy perspectives as well as political and security ones. This, in turn, makes it more effective in solving issues and achieving water security. The focus needs to shift from river-centric transboundary cooperation mostly at the regional level, where our engagement has been focusing on since early 2000s, to addressing specific issues of water security in the region at different scales and around different water sources. Accordingly, in the G5 Sahel, the Bank should pursue a two-pronged engagement in water security:

1. *Local water responses with cross-border and potentially regional spill-over effects.* Improving water security at strategic locations can help address cross-border and regional challenges through three main pathways:
  - a. *Reducing environmental migration and decreasing pressure on host communities.* Improving access to and management of water resources locally helps uplift the overall living conditions and resilience of local communities, thereby reducing (or at least delaying) the need to migrate to other regions, which often exacerbates or creates new challenges in host communities. As an example, preservation or restoration of watersheds that provide resilience to floods and droughts can boost shorter-term job creation while also providing long-term benefits.
  - b. *Reducing farmers-pastoralists conflict.* Pastoral movements in the Sahel do not know boundaries. By upgrading or developing water sources for pastoral use, new grasslands could be opened up for grazing and pastoralist routes could be diverted so as to delay or minimize encroachment in cropped areas.
  - c. *(Re)establishing citizens' trust in the state and contributing to overall security.* Policies to strengthen national and regional water resource management are likely to fail without the foundations of a renewed social fabric and trust in institutions, both of which can be achieved through people- and area-based interventions.<sup>104</sup> In fragile regions where resentment and perceptions of marginalization can result in violence or young disenfranchised men are easy prey for extremist/terrorist

groups, improving access to basic water services (together with other services, like education, health, energy, roads) helps restore state-citizen relationship and establish the state's legitimacy, which is a first step toward local and regional stability. Moreover, safely managed WSS services are indispensable components of human capital, as they contribute to raising living standards, good health, and high labor productivity.

To maximize their impacts, these responses may need a territorial/cross-border coordination. The area and scale of governance must be defined to inscribe the boundaries of the cross-border challenges that are to be addressed [see GPs 6 to 12].

2. *Regional response to water challenges directly linked to the shared water resources* that require a holistic, integrated regional coordination because of the increased hydraulic interconnectedness, such as development and management of large transboundary infrastructure or large water users/potential polluters (i.e., major cities, like Bamako or Niamey, or large irrigation schemes, like the Office du Niger in Mali) [see GP 13 and 14]

The Community-Based Recovery and Stabilization Project for the Sahel's Three Borders area<sup>105</sup> (Three Borders, P173830) is a promising example of good complementarity between local and regional interventions in a fragile area ("orange" and "yellow" zones). However, given the focus on recovery, water resources and possible conflicts around water access are only marginally considered. The regional Development Response to Displacement Impacts Project in Eastern Africa (DRDIP, P164101) also demonstrates that local water resource management activities can be used as vehicle to pursue both social cohesion and national and regional water security objectives. The project undertook targeted at -scale community-based watershed restoration which (1) helps capture rainwater through labor intensive public works and (2) integrates host and refugee communities.



**Guiding Principle 2. Implementation arrangements should reflect the specific issues being addressed and their scale. . In**

104 WGP, 2021. Water in the Shadow of Conflict: Water, forced displacement and conflict in the Middle East and North Africa. Water Global Practice, The World Bank (forthcoming).

105 Corresponding to the Liptako-Gourma area.



line with a problemshed approach, the Bank should explore options for counterparts for implementation beyond a reflexive recourse to RBOs as entry points. The most effective scale for transboundary cooperation is dictated by a specific issue or problem that more often than not is perceived at the sub-basin or cross-border scale, rather than at the whole river-basin level.

- a. Regional – The problemshed approach does not preclude a role for RBOs — on the contrary, RBOs like OMVS and NBA remain important counterparts for decisions at the regional level, including knowledge brokerage for the coordinated and informed development and operations of large dams (where clear river interconnectedness exists), allocating permits for large water users, and enforcement of certain legal instruments. Other regional organization could however also have stronger political leverage for strategic cooperation around specific issues (like, migrants), for instance the G5 Sahel group, or CILSS. In certain cases, setting up bilateral platforms of dialogues between countries, so they are able to exchange on key decisions, is also important.
- b. National — Lessons learnt show that the involvement of national entities has been limited. Therefore, a process of cooperation that helps build trust and deeper relations and understanding between countries has to take place alongside national and local-level activities and capacity strengthening. One example is the Niger-IWSP, which is implementing a sub-basin and local-level water platform for coordinated water management and investments across different sectoral ministries. National level institutions are important for the development and management of large-scale irrigation, water supply, and sanitation investments. Moreover, they oversee the development and implementation of National Development Plans and are key actors in the much-needed update of the inventory of pastoral water points, as a first step towards an integrated planning for improving the pastoral water network. They can set and enforce users' rights, pollution control, land tenure arrangements, and so forth. They are also responsible for providing services like health and education, that are key in fragile

areas. The update of the inventory of pastoral water sources in Niger is a first step towards an integrated planning for improving the pastoral water network.

- c. Local — At the local level, the key objective is restoring trust via dialogue. This can be facilitated by supporting the individual groups inside a community to develop needs assessments and prioritization of activities that then the local governmental institutions will implement. In fragile contexts with weak state presence, it is particularly important to rely on organizations that have both the know-how and community trust, be they NGOs, community-based organizations, private sector or other. As a recent Bank-led and CIWA-funded diagnostic of civil society organizations in West Africa points out, CSOs can play a key role to advance a water security agenda and contribute to the socio-economic development of the region. In the G5 Sahel, CSOs in Burkina Faso have demonstrated remarkable strength, leading to legal reforms, social movements, and changes of leadership.



**Guiding Principle 3. Ensuring sustainability of water security investments requires a shift in the approach to institutional design and capacity building, both at the national**

**and regional level.** Given the key role of water in the G5 Sahel, it is important to initiate a long-term process of regional collaboration on water security across the G5 Sahel countries that will take time to grow and mature. Experience shows that a long-term perspective is needed to build resilience, and to capitalize on cooperative management of (transboundary) water as a regional public good. To be effective, water security interventions require strong water resources management institutions at both regional and national levels. While our past and on-going engagements in transboundary water have systematically included strengthening the regional institutions, they have not, in general, built the capacity for water resources management at national level. And yet, “regional efforts towards water security are much harder to deliver if individual countries do not have the institutions and capacity to manage water resources and are not prepared to confront water extremes, such as floods and droughts”.<sup>106</sup>

106 WGP, 2021. Water in the Shadow of Conflict: Water, forced displacement and conflict in the Middle East and North Africa. Water Global Practice, The World Bank (forthcoming).

A less prescriptive and more adaptive approach to institutional design could be more successful at the national levels, by relying primarily on an incremental transformation of the mandates of existing institutions, around concrete decision-making processes, accompanied by setting of realistically achievable goals and provision of needed technical assistance. To date, the guiding institutional framework for World Bank investments in integrated water resources management has almost always included the establishment/strengthening of dedicated IWRM agencies as a core intervention. This approach is problematic in environments of low state capacity and meagre resources, as evidenced by a mixed record or organizational performance, with few successes limited to entities largely at regional levels (such as OMVS). One way of strengthening these institutions is supporting them in collection and dissemination of data, fundamental for making informed decisions.

At the same time, at the regional level, RBOs have a key role in centralizing technical and hydrological knowledge. As such, they are best positioned to potentially unlock political deadlocks by diverting the discussion on a less sensitive technical (undisputable) level. The successful process brokered by NBA around the site of the Fomi dam exemplifies this. Thanks to NBA's facilitation of evidence-based decision making around Fomi Multipurpose Dam on the Niger River in Guinea, the project was put on hold as the original

site implied significant downstream impacts onto the ecologically rich and sensitive Niger Inner Delta as well as resettlement impacts.

Thus, strengthening the technical, research and communication function of RBOs can be a steppingstone towards regional knowledge brokerage, which is increasingly needed, given the many new transboundary infrastructures being coming online. Moreover, focusing efforts on fostering the continuity and effectiveness of the knowledge functions of RBOs may provide a greater return on investment than a top-down blanket approach to organizational capacity development. This should be expanded to groundwater, currently largely absent in the RBOs programs. One example is promoting transboundary governance at the aquifer system levels clearly identified from the hydrologic basins, and in this regard for instance supporting the on-going initiative for transboundary cooperation around the Senegal-Mauritanian Aquifer Basin (SMAB); and/or data exchanges on the Taoudeni aquifer shared by Mali and Mauritania.

Despite common beliefs and significant research pointing to the importance of committed and motivated public servants in improving agencies' performance, national and regional level public agency staff –are still rarely considered key stakeholders in interventions. The Field-Level Leadership approach is showing promising results in improving the performance of water agencies (Box 5).

#### **Box 5 Field-Level Leadership: leverages the motivation and behavior of public agency staff as a means to improve performance of water agencies**

In 2020, FLL was implemented in the Addis Ababa Water and Sewerage Authority. After just one year, the agency is benefitting from higher revenues and improvement in water delivery to least served populations, and from less non-revenue water, and late arrivals at work. As a result of staff-initiated efforts, some branches have geo-mapped the water supply network; efficiency at sludge transfer stations has increased by 37 percent; technical modifications have been implemented to increase the hose limit on suction trucks from 30 to 42 m; mobile alerts to customers to improve bill collection rates have been introduced;

customer records system have been modernized; long-standing construction delays have been resolved without higher-level intervention; and multiple efforts are ongoing to initiate water savings at workplace.

The positive results from FLL implementation in the Addis Ababa Water and Sewerage Authority have contributed to a significant increase in demand, beyond the originally envisaged projects. As of early May 2021, 20+ projects in water and other GPs, including collaborations with development partners, have requested or expressed interest in implementing FLL with client agencies.



**Guiding Principle 4. Ensure coherence between key public policies and investments so that they do not increase tensions around water resources.** Multisectoral engagement,

whether World Bank-funded or from other financing sources, should be leveraged to ensure coherence between national and regional public policies. Several of the conflicts around access to water resources stem

from public development policies covering only certain water users and not others. For instance, agricultural development policies largely ignore pastoralists, which have been mostly invisible in national development policies; national pastoralist policies often do not consider harvest times for the farmers; etc. To work towards water security in the Sahel as a way to reduce tensions and migration, it is important to contribute towards the alignment and coherency of the different national and regional agricultural policies, pastoral policies, local development plans, land use policies, land tenure policies, etc. It is equally important that these efforts are mirrored by the World Bank investments nationally or regionally and that the WBG operations also have the same coherence.

GP5

**Guiding Principle 5. Innovation and technology as part of improving water security in fragile areas.**

Several tools exist that help the coordination amongst partners and the remote supervision in fragile areas. The project geo-capacitation method (GEMS) was launched by the FCV group to improve Monitoring and Evaluation and supervision and monitoring by third parties in fragile contexts. This is done by building the capacity of clients, partners and Bank teams in the field, to take advantage of low-cost open-source technology for real-time digital data collection and analysis. The use of GEMS tools and methods enables operations to create customized digital M&E systems to improve transparency and accountability for implementation throughout the project cycle. Additionally, GEMS provides platforms for remote supervision, real-time risk and backup monitoring, and portfolio mapping for coordination between projects and partners.

However, more work is needed to complete the GEMS/ Kobo ToolBox database and achieve a higher level of granularity, to the district level — which in turn will help better focus future interventions by facilitating coordination across programs. A strong recommendation is therefore to continue mapping WB interventions on the ground, to the level of communes or sites covered by the activities of existing projects. Though an extensive exercise, it is fundamental information to improve coordinated interventions in these key hotspot areas.

Given recent geo-spatial and data accessibility, a user-friendly platform should be part of the project, including all relevant and free data sources related to water quality and availability and integrated into tools such as Geo-ESF (under development) and not just KoboToolBox. Many World Bank projects are doing this individually, but

the data to be compiled in the pilot phase (latest) would be an excellent reference point for full-fledged design and implementation.

Regardless of the tools used, it is very important to ensure the integration of the latest scientific research and technology with traditional practices and community needs.

**Preparing local water responses with cross-border and potentially regional spill-over effects**

GP6

**Guiding Principle 6. Adopting an Integrated Territorial Approach allows to coordinate local water solutions with complementary services in order to maximize cross-border and regional impact.**

The assumption here is that addressing cross-border water security challenges will contribute to overall regional water security and resilience if coordinated through a holistic territorial response, or Integrated Territorial Approach. The adoption of an Integrated Territorial Approach is based on the premises that spatial prioritization and coordination can (1) unify sectoral approaches in a particular location, leveraging complementarities and (2) help tailor responses to local endowments and severity of constraints. Such an approach brings in the question of “where to invest” squarely alongside the question on “what to invest?”. Efforts for a more water secure region would benefit from adopting the Integrated Territorial Approach for the following reasons:

- a. Under such an approach, a water security program would consider *all the water needs of different users when developing water sources*, therefore bringing together the perspectives, needs and potential impacts of these stakeholders in the design of a coherent and coordinated intervention. Today, an irrigation project rarely considers pastoral or domestic water uses, a rural water supply project only considers the domestic needs and ignores other productive uses of water, and so forth. A project on pastoralist water points rarely considers parallel investments in rehabilitating grazing areas. Moreover, water investments need to be understood and planned within a wider catchment perspective balancing the needs of upstream and downstream water users. In this sense, decisions that alter access to shared resources may need to be accompanied by complementary investments

### Box 6 The integrated territorial approach in practice: the North & North-eastern Development Initiative (NEDI) and the Integrated Landscape Management approach piloted in Tunisia

This approach was used to help prioritize interventions in Northern Kenya, which faces similar challenges as the G5 Sahel, and piloted in Tunisia with very positive results.

The North and North-eastern region of Kenya is historically underserved and is performing below national average on development indicators. Poverty levels are extremely high at 70 percent, compared to 45 percent national average. The road networks are poor to nonexistent; electricity access is at 7 percent; only 45 percent of households have access to safe water and, only 26 percent have access to improved sanitation.

The area is arid or semi-arid and recurrent droughts create vulnerabilities for the population, 90 percent of whom rely on livestock. Over the past decade, losses in livestock populations due to drought related causes amounted to nearly US\$1.08 billion. Cattle rustling and resource-based conflict are key sources of insecurity. Conflict in the neighbouring countries has also resulted in the protracted presence of refugees in the region.

The Government of Kenya with World Bank support launched in 2018 the US\$1 billion North & North-Eastern Development Initiative (NEDI)<sup>107</sup> in 2018 that increased investments in the region with a special focus on transformative and integrated infrastructure investments and support to sustainable livelihoods. The NEDI program includes six individual yet spatially coordinated projects across transport, water, energy, agriculture, livelihoods and social protection in the North and North Eastern regions of Kenya.

Along similar lines, the Integrated Landscape Management (ILM) approach described in Section I.2.2 was successfully piloted in Tunisia through the Oases Ecosystem and Livelihood Projects (P132157). The Project enabled the piloting of the ILM approach for oasis management in six representative oases in Tunisia. The fact that the Government requested a loan from the World Bank to scale-up the approach to all oases in the country (P169955) and in the lagging North West and Centre West regions (P169955) attests for its success and relevance. The project also scored positive sustainability gains in awareness and capacity development, which are now anchored in local institutions and communities, with positive policy implications for the future. ILM differs from ITA insofar as it focuses on livelihood opportunities, and generally does not include services such as water supply, electricity, health, etc. However, its focus on both the long-term process and its participatory nature is very similar to those advocated by the ITA and reiterate once again the importance of an integrated, bottom-up, participatory planning and implementation exercise.

Though these approaches are still not mainstreamed in the G5 Sahel World Bank portfolio, their application focused on land and water as key coalescing resources is being pioneered through the US\$400 million Niger Integrated Water Security Platform Project (NIGER-IWSP, P174414 – see Box 7) in Niger and the US\$350 regional Food System Resilience Program project (FSRP, P172769), both under preparation.

in governance, institutions, and effective social protection systems for the poorest and most vulnerable populations.

- b. Moreover, despite water being an excellent entry point for interventions in the G5 Sahel, *achieving resilience and growth requires complementarity with other services*. Solutions must derive from coordinated transdisciplinary planning and implementation where investments in different socio-economic sectors complement and reinforce each other. The Sahel Alliance itself highlights the need for an integrated territorial

approach, which defines the areas in which the members of the Sahel Alliance could work together by establishing a close dialogue on the ground which either use water as an input or may affect its quality or accessibility. Focusing planning on a given area helps address all needs in a coordinated manner.

- c. This approach would help structure an institutional change as well, to reflect different governance needs in a stronger *cross-sectoral harmonization*. To adequately address the complex problems the region is facing,

107 <http://documents1.worldbank.org/curated/en/556501519751114134/pdf/NEDI-Boosting-Shared-Prosperity-for-the-North-and-North-Eastern-Counties-of-Kenya.pdf>



development initiatives and World Bank projects must move away from the historical model of design and implementation by individual entities working in isolation towards ensuring adequate consultations take place around a common and integrated vision for development. Cross-sectoral harmonization goes beyond the involvement of corresponding WB Global Practices and requires the active participation of all concerned sectors from the Government side and synergies with all development actors. In line with the ITA, it would be helpful to have decision-making committees linked to a specific program or project, or project target area — *problem-centred water platforms*. The aim is for these platforms to coordinate the development and implementation of the integrated territorial approach in a selected cross-border area. The platform would not be a legal entity in its own right. Moreover, this decision-making body should leverage on what decision-making bodies already exists in a given area, though it needs to represent all water users.

The integrated territorial approach is not meant to replace a watershed perspective but to include it at the appropriate scale. Strong hydrological analysis needs to be embedded in the design of integrated territorial interventions (including analyzing how different water uses will impact or be impacted by a given intervention). Often, however, except than for large infrastructure, hydraulic interconnectedness, which translates in specific issues/problems, only materializes at the sub-basin scale. Thus, while a watershed perspective is needed in the analytical/preparatory phase to assess the extent to which a given project is affected by or affects water uses upstream and downstream, from a project management perspective a territorial approach seems more functional and effective, as it focuses on those different actors with a stake in the issue/problem.

**GP7** **Guiding Principle 7. Targeting water-sector interventions in the so-called “red-zones” (i.e., red areas in Figure 5) of the G5 Sahel to improve livelihoods and wellbeing could contribute to broader efforts to mend the frayed socioeconomic fabric of communities affected by conflict and forced displacement.** While these “red” zones are often avoided by international donors for security concerns, including by the World Bank, all strategies aiming to address fragility and conflict point to

the potential benefits that targeting and continuing to engage such areas represent. For instance, the International Crisis Group recommended reaching marginalized regions with small-scale projects to deliver livelihood benefits.<sup>108</sup> The joint World Bank Group (WBG) and United Nations (UN) Pathways for Peace report identifies four “arenas of contestation”, around which conflict takes place: (i) power and governance, (ii) service delivery, (iii) land and natural resources, and (iv) justice and security. Interventions to improve water security in very fragile areas can help address these arenas of contestations. For instance, developing a water source in a way that addresses the water needs of different uses could help reduce competition over land and water resources — particularly in the G5 Sahel where the red zones see frequent conflict between water users. Overall, these context-specific-designed interventions can maintain and create jobs and boost economic growth while restoring environmental services and natural capital. They also have a peacebuilding potential: inclusive, context sensitive interventions along a do-no-harm approach can also play a role in conflict prevention (over scarce water resources), conflict settlement (providing water to different uses can mitigate existing conflicts) and contribute to long-term peace building.

In these highly fragile areas, the critical factor that the water security program should consider is not merely the provision of basic services, but instead triggering a more systemic change toward (re)establishing the social contract between the State and the local population. This can be supported by promoting the dialogue between the State and the local population around the planning and provision of services, which, in turn, will raise State accountability and citizens’ trust in the State. Therefore, the program should adopt specific implementation and governance arrangements:

- a. Given the weak governmental presence, communities need to play a larger role, from project design via a participatory needs and conflict assessment and ensuing prioritization of investments feeding into local development plans, to monitoring and evaluation. Meaningful inclusion and management of their own activities by communities should be integrated into the design of any program on water security in the Sahel, but a well-thought through mapping of stakeholders’ roles and responsibilities for implementation and

108 International Crisis Group, 2018. Frontière Niger-Mali : mettre l’outil militaire au service d’une approche politique.

governance arrangements should also be part of the pilot phase described under GP (viii).

- b. In these fragile areas, it is recommended to leave procurement and implementation to governmental entities, as a way of reengaging the State, improving its capacity to deliver and raising its reputation among the local population.
- c. Working through local partners with boots on the ground and sound knowledge of the local context, such as NGOs in charge of the supervision of certain activities or monitoring and evaluation, can help ensure that local customs and power dynamics are respected, while also delivering project benefits through less intrusive interventions.
- d. In these areas, a close partnership with humanitarian, peacebuilding, and security actors is fundamental. Particularly in fragile contexts where large-scale peacekeeping missions are present, a multitude of actors work in overlapping, but still distinct, sectors on mitigating and transitioning from complex crises. Such partnership has been developed in the implementation of the Kandadji Project (P130174) intervening in the Tillaberi region of Western Niger, through agreements on information sharing with other development partners and governments,<sup>109</sup> and regular coordination with locally based NGOs like the Red Cross and UNHCR.

Because of harsh environments and challenges with community cohesion, security and state influence, the activities delivered in these areas need to be “light”, quickly implementable and flexible to be able to rapidly adapt to the changing security situation. A combination between fast deliverable toolkits that can be distributed in one-day mission and more complex interventions, like digging a well, is favorable. Sturdy, low-tech, minimal-maintenance, minimal-operation solutions are to be favored over high-efficiency solutions with high maintenance and governance requirements. Data collection through remote sensing – for instance on land uses, topography, water resources – helps inform the choice of these investments. Successful implementation

of small works like water points in the Gao area in Mali, using local firms, as part of Regional Sahel Pastoralism Support Project I (PRAPS I, P147674), show that these interventions are not only necessary, but also possible.

In situations of active conflict, it will be impossible to address some of the structural sector issues. However, development actors should remain engaged to support the work of humanitarian and security actors through, for example, data collection and sharing and capital injections.



**Guiding Principle 8. Allowing sufficient time for a pilot phase, supported by strong analytics, before scaling up would help develop a better understanding of the**

**context on the ground and maximize the positive development impacts.**

In the G5 Sahel fragile and resource-scarce setting, where development financing of water related projects is a double-edged sword that both has the potential to alleviate poverty and to exacerbate conflict, it is important to start small. This allows time for (i) better understanding the reality on the ground, including conflicting interests and local power dynamics, and (ii) testing and fine-tuning the concept before scaling up. This can be done within one project, for instance piloting activities in the first two-to-three years and then scaling up in the remaining duration of the project, or as separate phases of a larger program. Consistently leveraging strong analytics to inform project design can help make the most of available information and best structure such pilots, as the successful experience from Somaliland show. There, the engagement began with a pilot on water infrastructure, followed by a pilot in support of livelihood services (Water for Agropastoral Livelihoods Pilot Project, WARP, P152024). Based on the results of the pilots, technological options were expanded in another pilot, followed by an expansion in geographic coverage (under Water for Agro-pastoral Productivity and Resilience, WALP, P167826). The Tunisia ILM example described in Box 5 also shows the importance of starting with a pilot. Accordingly, the preparatory work should include:

- a. Mapping of rural livelihoods to understand land uses and water needs of different groups and potential competing interests. To support this important aspect, the task team should also

109 The Kandadji Program is financed by eleven donors and the Government of Niger: African Development Bank (AfDB), The World Bank Group (IDA), Islamic Development Bank (IDB), West African Development Bank (WADB), French Development Agency (Agence Française de Développement, AFD), Arab Bank for Economic Development in Africa (ABEDA), Economic Community of West African States (ECOWAS) Bank for Investment and Development (EBID), Abu Dhabi Fund (ADF), Kuwaiti Fund (KF), Saudi Fund for Development (SFD), Organization of the Petroleum Exporting Countries (OPEC) Fund for International Development (OFID).

include an expert on socio-ethnic dynamics since so much conflict can also be linked to tensions between groups. In very fragile area, this study should also include an analysis of the conflict itself, to make sure interventions will “do no harm”.

- b. Sound understanding of conflict resolution mechanisms and the scale at which they operate to design the right type of intervention, including providing assistance to these mechanisms. For instance, if conflict resolution mechanisms only exist at the very local level, they will not be able to manage conflicts that emerge from large projects. This is one of the reasons for the Bank choosing to focus on small, decentralized investments in sand dams in Somalia rather than rehabilitating the irrigation barrages on the Shebelle and Jabba rivers.
- c. Land tenure arrangements, including the potential co-existence of a plurality of rights and invisible users (mobile versus sedentary communities).

(a), (b), and (c) should include a gender analysis to understand different perspectives, needs, and capacities of men, women, youth, elderly, differently abled, and other vulnerable groups and incorporate them in the planning and implementation.

- d. Sound hydro(geo)logical knowledge at basin scale when selecting investments and in planning their operation, including proper consideration of scenarios of future water availability. Currently, data on the availability of water resources remain scant. In most countries, water resources are only monitored in the areas covered by Regional Basin Organizations, thanks to continuous donor support. However, it is fundamental to conduct studies on water availability at the sub-basin and administrative areas levels, as these are the scales at which most decision making happens. Such analysis has recently been carried out for Iraq<sup>110</sup> to help governorates visualize their water balances as a step towards updating the national strategy. This should include a breakdown of the flows needed to maintain ecosystems and ecosystems services.

- e. Incorporating (climate change) resilience considerations into project design. Climate change trends and risks need to be fully built into planning, ensuring that infrastructure is climate-smart and resilient. For climate change, the Water Global Practice has produced several guidance notes for task teams to evaluate the robustness of projects to future scenarios such as the [Decision Tree Framework](#) and the [Road Map “Building the Resilience of WSS Utilities to Climate Change and Other Threats”](#). The methodologies proposed in these notes should be integrated consistently in all investment prioritization exercises. The small and medium infrastructure investments should for instance consider the provisions identified in the World Bank’s [“Resilient Water Infrastructure Design Brief”](#), which focuses on incorporating resilience (to floods, droughts and high winds) into the engineering design of drinking water and sanitation infrastructure. By knowing the existing system and its vulnerabilities under different future scenarios, decision-makers can identify, among planned actions or proposed investments, which are most likely to help fulfil the system’s objectives (service provision and quality, for example) in the face of these different sources of uncertainty (population growth, migration, changing demand, climate change, etc.). While such approaches have not been applied in the G5 Sahel, in Kiribati they have supported the identification of water sources to be developed and supported under a project under preparation and in Lima, Peru, they have allowed for the prioritization of investments towards water services resilience among the long list featured in the service provider’s Master Plan.

Though (d) and (e) apply to all water-development projects, getting it right is even more critical in fragile contexts, to avoid doing any harm.



**Guiding Principle 9. Addressing the water needs of pastoralists is a matter of regional security.** It is key to help mitigate farmer-

pastoralist conflicts, which, we know, extend beyond borders. Supporting the joint development and sustainable management of water points for livestock, linking access to water and access to grazing, enhances

110 <https://operationsportalws.worldbank.org/Pages/DocumentProfile.aspx?projectId=P163615&DocId=56&IsCovGen=true&removePublic=false&stage=AUS>

pastoral mobility as a key element of pastoral and ecosystem management. Well-planned water resources development enhances both livestock and grazing land productivity by first opening up new grazing resources, second increasing the efficiency of feed utilization by reducing the distance animals have to walk to the water point, third reducing animal disease with improved water access. Additionally to developing water for drinking, improving water buffering to extend grassland productivity in time can delay migration of pastoralists toward cross-border farmed areas thereby alleviating tensions between these two groups as this would give farmers just enough time to harvest the crop before livestock enters the fields. Given the economic importance of the livestock (and pastoral) sector, developing pastoral water points must be seen as a key economic strategy.

Moreover, as water resource development is one of the most demanded interventions by pastoralists, well-implemented water points can be a major step towards (re)gaining pastoralists' trust. On the implementation side, the planning, design and management of water points need to be fully harmonized with the productivity potential of the surrounding grassland and respect its seasonality, and their use regulated by clear rights, including the definition of priority uses. Given the highly sensitive and contested nature of water in agro-pastoral areas, experience gathered in the PRAPS I highlight the successful application of the social engineering approach for inclusive design and implementation of pastoral water infrastructure. The National Strategies for Pastoral Water Points of Mali, Niger, and Chad, are additional important guidelines for the concerted development and management of pastoral water points, identifying priority zones and types of interventions.

**GP10** **Guiding Principle 10. Improving the performance of existing infrastructure provides high positive impacts with relatively simple interventions.**

There is a huge opportunity in the G5 Sahel region for improving the performance of existing infrastructure, from storage to irrigation to water supply systems. Many infrastructures exist which are in a state of disrepair, or whose efficiency can be significantly improved. This is the case of many dysfunctional water supply systems, particularly in rural areas, which, if rehabilitated or improved, would significantly ameliorate rural access to safe water and sanitation, with the corresponding human capital benefits, and reduce water-borne diseases. Serving the

“last mile” is especially important to alleviate women’s burden of collecting water. Other infrastructures that were originally designed as multi-purpose, now only provide single-use services. In turn, there is ample possibility to retrofit projects to benefit more sectors (e.g. from single purpose to multipurpose storage). In Burkina-Faso, one of the Government’s top priorities for water resources management is the rehabilitation of several dams. The Government of Mali highlighted the need of rehabilitation and maintenance of the existing Manantali, Sotupe2, Markala, and Selingue dams — though national investments, key for water security in the region. Other investments to improve the water use efficiency and productivity of large-scale irrigation include those proposed by the Government of Mali on the rehabilitation of the Office du Riz de Segou and Office du Niger. However, any investment in rehabilitation or modernization of existing irrigation schemes must be contingent on the actual implementation (beyond simple promises) of major progress toward structural reforms to create the incentives needed to achieve sustainable high performance.

**GP11** **Guiding Principle 11. Increasing agricultural productivity hinges upon the development and implementation of viable and context-specific irrigation strategies that account for water resources availability, capacity building needs and other factors influencing production and marketing.**

The case for investing in irrigation is compelling: it is a source of improved productivity and output, increased rural incomes and employment, and food security at both local and national level. However, irrigation investments face numerous economic, technical, institutional and financial constraints that can only be addressed if projects build on a comprehensive irrigation strategy. A viable irrigation strategy selectively supports a variety of fit-to-purpose irrigation typologies in terms of water source mobilized (river, groundwater, and water harvesting for supplemental irrigation), system size and type of ownership and management (small-medium scale, private/village-cooperative/PPP), in order to match the specific context. The role of the private sector can vary significantly depending on the context, and as such, it should be devoted particular attention. Often, different water sources could be used in alternate combination, such as the conjunctive use of surface and groundwater. However, in order to avoid groundwater overdraft, it should be carefully planned and regulated at the scheme or (sub) basin level.<sup>111</sup>

111 World Bank, 2006. Conjunctive use of groundwater and surface water. Agriculture&Rural Development Notes. Issue 6.



Moreover, a profitable and sustainable transition from rainfed to irrigated agriculture requires carefully planned capacity building and support (note: detailed livelihood assessments are critical in structuring such activities). This requires, amongst others, a higher degree of farmer organization and professionalization centered on communities of smallholders rather than individual smallholders.<sup>112</sup> Ongoing studies indicate possible future pathways towards a viable irrigation sector incorporating public-private partnerships, agribusiness and smallholder collaboration, and commercially-oriented development of smallholder irrigation using technologies ranging from water harvesting to small community-based schemes (see ASA on Water Security in Burkina Faso, P174857).

The illusion of abundance that the availability of irrigation in arid areas can create incentives for water-demanding crops unsuited to these regions, which may result in resource exhaustion, particularly of “invisible” groundwater,<sup>113</sup> and in more vulnerable agricultural systems. This has happened in several places around the world, including Spain and California. Thus, while necessary, these investments must be combined with policies and regulation mechanisms promoting sustainable water use.<sup>114</sup>

Finally, choosing crops that have a higher productivity in terms of kcal/ha instead of kg/ha while consuming less drop per crop, such as tubers and roots, represents a cross-sectoral water-sensitive adaptation measure. While tubers and roots grow generally in wetter areas, growing them in drier zones would require less irrigation water than crops like rice and maize, for instance, which are less caloric yet widely promoted in these dry areas.

Therefore, irrigation investments in the G5 Sahel countries should support a broader, more integrated vision of irrigation that incentivizes water savings.

**GP12** **Guiding Principle 12. Improving the natural capital by investing in catchment-based WRM, SLWM, and Farmers-Managed Natural Regeneration<sup>115</sup> practices at scale is key to supporting livelihoods and agricultural**

**productivity, while mitigating water-based hazards and resource-based conflicts – with frequent cross-borders benefits.** Land and natural resource degradation cause loss of land productivity and livelihoods and are a main contributing factor of conflict and migration. In fact, soil fertility is the second-most limiting factor for agricultural development and productivity in the Sahel, calling for a much better integration of soil fertility management and water development projects. As part of this, biodiversity protection and conservation must be considered as an integral part of agricultural development and natural resource management initiatives. In fragile ecosystems, like the G5 Sahel, the practice of protecting and preserving the wealth and variety of species, habitats, and genetic diversity proved to be an important element in improving human health, wealth, food, energy and services, including ecosystem functions (such as fertilizing the soil, recycling nutrients, regulating pests and disease, controlling erosion, and pollinating crops and trees).

Moreover, past projects have largely focused on the mobilization of “traditional” sources of water, mostly surface but recently also groundwater. Yet, there is huge untapped potential for runoff and flood harvesting, provided sound hydrological analysis is embedded in the planning. This implies analyzing the (sub)catchment inter/intra-annual and multi-year water balance to assess harvestable surpluses and understand how local on-slope buffering is connected to the wider catchment hydrology. If combined, water harvesting at the catchment level combined with sustainable land management to control erosion and regenerate soils is a win-win: it buffers against droughts while preventing disruptive floods downstream. Water buffering combined with land and soil regeneration enhances land productivity, retains more water in the catchment for multiple uses, prevents that excessive runoff turns into damages downstream, and protects downstream infrastructures from sedimentation.

The Sirba basin, shared by Burkina Faso and Niger, illustrates the importance of these interventions: highly degraded on the Burkina side, the erosion causes violent and suddenly floods that more and more frequently lead

112 Lankford, B. 2009. Viewpoint — The right irrigation? Policy directions for agricultural water management in sub-Saharan Africa. *Water Alternatives* 2(3): 476–480

113 Damania, R., Desbureaux, S., Hyland, M., Islam, A., Moore, S., Rodella, A.-S., Russ, J., Zaveri, E., 2017. *Uncharted Waters : The New Economics of Water Scarcity and Variability*. World Bank, Washington, DC. © World Bank. <https://openknowledge.worldbank.org/handle/10986/28096> License: CC BY 3.0 IGO.

114 WGP, 2021. *Ebb and Flow: Water, Migration, and Development*. Water Global Practice, The World Bank.

115 FMNR is a highly effective agroforestry solution, characterized by technical simplicity and low cost. It consists of pruning seemingly dead tree stumps and carefully managing their regrowth (rather than planting new trees). Initially developed in Niger, where over 5m hectares have been successfully restored with FMNR, the method is now spreading across Africa and South East Asia.

to damage in Niamey. The FSRP is intervening in this area, with watershed restoration on the Burkina side and flood control structures on both banks in the lower valleys, but much remains to be done.

Finally, wetlands of the Sahel, among which, the Niger Inner Delta and the Lake Chad feature most prominently, have an enormous role to play in sustaining local livelihoods and providing a large range of social and ecosystem services such as buffering flash floods and water quality. Therefore, the sustainable management and regeneration of wetlands should be seen as an integral part of the World Bank strategy for water security in the region.

For the success of these interventions, it is critical to combine adaptation measures to enhance the resilience of natural capital, and economic measures for enhanced resilience of people.

### Preparing a regional response to water challenges directly linked to the shared water resources

GP13

#### **Guiding Principle 13. Securing long-term water security for the large urban agglomerations in the region will require placing cities as a user within a catchment or problemshed.**

As the economy, ecosystems and well-being in these cities are inherently connected to water security, future water-services focused projects must place the city as a user within the broader catchment and problemshed to ensure water resources are a key consideration in decision-making. Once again, investments cannot prescind from through catchment-level water balance assessment considering multi-year water variability and climate change projections of future water availability. As water availability decreases and becomes more unreliable, and cities grow, urban water security will depend on expanding beyond an access-focused approach towards the delivery of resilient and inclusive services that make the most of existing infrastructure, managing demands, designing out waste and pollution through efficiency and resource recovery, and the regeneration of natural systems and closing the water services cycle.

In addition, WSS projects can no longer afford to focus only on the urban space and must account for other uses and broader availability and management of water resources. Some cities in the G5 Sahel are already putting these principles in practice in line with the Water in Circular Economy and Resilience (WiCER) approach. In Ouagadougou, ONEA has engaged the private sector to roll out WSS services in hard-to-reach, unplanned areas and to reinforce the sanitation service chain, ensuring masons are trained to build latrines up to code and accessible, pit emptiers are well organized to access customers needing their latrines emptied, and sludge treatment infrastructure is well developed with a focus on avenues for reuse. Increasing focus is being placed on the availability and knowledge of water resources to ensure Ouagadougou can diversify its supplies from the Ziga dam reservoir.<sup>116</sup>

GP14

#### **Guiding Principle 14. Leveraging the World Bank's convening power would help better steer decisions around large game-changing infrastructure for regional (water) security.**

Large dams such as the one under construction in Kandadji, Niger, have the potential to increase irrigation and electrification. As such, they could be seen as part of a "big push" package of investments,<sup>117</sup> increasing expectations related to future economic performance and acting as a multiplier of investments that follow, leading to a takeoff in economic growth. At the same time, dams displace people. Benefits largely depends on where communities live and their ability to adapt to changes in cropping and irrigation patterns. A closer look at the complementary interventions needed to achieve a more equitable distribution of benefits is necessary as compensations mechanisms largely rely on imperfect markets and institutions to alleviate the adverse impacts of dam construction, and its long-term impacts.

Whether the Bank finances these large investments or not, there is a great value to engage in dialogue through water platforms with governments, regional agencies, and other development partners to ensure that solutions around these large dams are well identified and implemented. The Bank is uniquely positioned to drive/moderate the decision-making process around some of these key infrastructure investments, for three key reasons: (i) to ensure that the proper conditions are satisfied in terms of safeguards, in line with international best practice, for instance for the

<sup>116</sup> World Bank. Forthcoming. Burkina Faso Water for Development.

<sup>117</sup> World Bank, 2020. Creating wealth, improving lives, and securing the environment: Transforming Agriculture and Ensuring Land and Water Management for a Resilient Sahel. Africa SD Priorities for the G5 Sahel Countries.

protection of critical ecosystems like the Niger Inner Delta (ii) to encourage a broader spatial development package to promote economic growth and livelihoods and achieve a more equitable balance between local and national/regional development, and (iii) to bring in other financiers to the table.

For instance, World Bank involvements have succeeded to avoid major irreversible decisions with high impacts. In the case of the Kandadji dam on the Niger River in Niger, the Bank's engagement helped shift from a

national to a regional-centered project by making it economically attractive to a larger number of riparian states by guaranteeing sufficient low flow for various uses (agriculture, fisheries, ecosystem, etc.) downstream to Nigeria, and phasing dam construction to allow for the full implementation of resettlement in Niger before impacting Mali. The Bank is also leading the financing and steering the resettlement plan, the successful completion of which is a prerequisite for impounding the area and start enjoying the benefits derived from the services of the reservoir.

**Box 7 The Niger Integrated Water Security Platform Project (P174414) spearheading the water security agenda in the region.**

A Sahelian country, Niger faces a number of mutually reinforcing challenges aggravating water security<sup>118</sup> – including poverty and a lack of economic diversification, high climate variability, natural resource degradation, fragility and rapid population growth. Niger's pervasive poverty is intertwined with the complete reliance of entire communities on the exploitation of natural resources.

The Niger Integrated Water Security Platform (IWSP) Project seeks to overcome these challenges through an integrated platform approach to water-related planning, policies and investments that reduce fragility, increase broad-based resilience to climate variability, and lay the foundations of socio-economic development in Niger. This systematic approach would aim to support self-reinforcing livelihood-enhancing interventions from the household level to the provincial level, and crucially, overcome issues around the protection, management and knowledge of water resources and associated natural environments. This will be facilitated by strengthening the

capacity to engage citizens, raise their awareness, and promote climate-smart behaviours. To respond to this reality, the project intends to promote socio-economic development through: (i) strengthening the management of water resources, (ii) supporting increased access to water services, and (iii) improving the resilience of livelihoods to climate variability in select areas of Niger. In particular, interventions would span the areas of "water writ large": water resource management and ecosystems regeneration, irrigation and optimized rain-fed agriculture, flood management, and sustainable and safely managed drinking water and sanitation.

The project thus aims to foster cross-sectoral coordination and promote the link between water services development (WSS, irrigation) and water resources management at the national scale, creating a platform for urban uses and priorities to be weighed within the broader water balance, while existing engagements have emphasized the reduction of non-revenue water and improved services efficiency.

<sup>118</sup> Water security is defined as "the availability of an acceptable quantity and quality of water for health, livelihoods, ecosystems and production, coupled with an acceptable level of water-related risks to people, environments and economies plays." (Grey and Sadoff, 2007)

